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This collection of papers includes the following: "Preface: The Acquisition of Celtic Languages" (Jeffrey L. Kallen); "The Development of Finiteness in Early Welsh" (Robert D. Borsley and Bob Morris Jones); "Acquiring Subject and Object Relatives; Evidence from Irish" (Helen Goodluck, Eithne Guilfoyle, and Sile Harrington); "The Language Development of a Welsh-Speaking Child with a Cochlear Implant" (Janig Stephens and Jackie Richards); and "The Acquisition of Grammatical Gender in Welsh" (Virginia C. Mueller Gathercole, Enlli Mon Thomas, and Nadine Laporte). The collection also includes a book review, "Review of SpeakWrite Irish and Focail Drafochta" (Thomas W. Ihde). (Papers contain references.) (SM)

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2001

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JOURNAL OF CELTIC LANGUAGE LEARNING

The *Journal of Celtic Language Learning* (ISSN: 1078-3911) is an international review for researchers and teachers of modern Celtic Languages. The official publication of the North American Association for Celtic Language Teachers (NAACLT), *JCLL* includes papers presented at the Association's annual conference in addition to manuscripts submitted by scholars of modern Celtic languages world-wide. It is also a forum in which modern Celtic language teachers can share insights into methodology with their peers.

JCLL's mission, similar to that of the NAACLT, is to provide another forum in which teachers and applied linguists can contribute to the literature presently available on bilingual and second language acquisition, as well as increase communication among modern Celtic language teachers and researchers.

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Volume 6 2001

Special Issue: First Language Acquisition

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PREFACE: THE ACQUISITION OF CELTIC LANGUAGES

Jeffrey L. Kallen
Trinity College Dublin

Some problems of Celtic language acquisition

It has long been recognised in the field of second language teaching and learning that there is some kind of relationship between the process of first language acquisition and that of learning language as an older child or adult in a classroom or other structured environment. The precise nature of this relationship, however, is by no means clear. Differences between first and second language learning may be *internal* to the mind and brain, *external* in so far as the linguistic environments are usually different for each type of learning, or *interactive* to the degree that the individual brings different attitudes and motivations to the language learning process in different social settings. Then again, apparent differences between first and second (or plural) language learning may not really be that great: conventional wisdom and particular research traditions hold that children have a natural superiority in language learning, sometimes attributed to the biology of brain maturation, yet more recent work and counter-evidence urges us to be cautious and qualified in accepting such a view (see, for example, Scovel 1988, Singleton 1989, and Bialystok and Hakuta 1994). Either way, or perhaps just because the field is still full of unanswered questions, the relationship between first and second language acquisition poses a central problem for anyone who works with language learning.

The problem of language acquisition is particularly acute for the Celtic languages, since most children acquiring a Celtic language as a first language do so in a minority language environment in which bilingualism with the socially dominant language is an inevitability. The effect of this large-scale bilingualism is twofold. Obviously, it becomes difficult to find children whose linguistic environments are so monolingually Celtic that they represent the 'pure' unfolding of a Celtic language in the mind. It thus becomes difficult to know if a child's deviation from the adult language norm is attributable to developmental errors of the kind typical of children everywhere, or if cross-linguistic interference from another language is involved. Due to the diversity of language inputs and environments for children learning Celtic languages from birth, it also becomes difficult for applied specialists such as classroom teachers or speech and language therapists to establish linguistic norms in the acquisition process: 100 learners of a minority language in a bilingual context may well show more

diversity in their proficiency in the language than a comparable 100 monolingual learners of English or French in a stable majority situation.

Moreover, the effect of bilingualism in the acquisition process cannot be understood simply in terms of an effect on the language learner. A converse relationship is also important, i.e., the language itself may undergo change as it is learned by successive generations of bilingual speakers. In Ireland, for example, this effect is at least anecdotally reported up through the school years: Irish-medium schools may be the stronghold of maintaining the language, but they are also a rich breeding ground for code-switching, bilingual language influences, and other distinctive linguistic changes. In such cases, deviations from textbook norms may not represent developmental errors or active cross-linguistic interference, but a shift in community norms which grammar books are slow to reflect. The researcher investigating language acquisition for the Celtic languages is thus faced with a challenge, to understand not only the process itself, but to interpret it in the light of a changing social and linguistic environment.

A confluence of interests

Given the linguistic, social, and psycholinguistic dimensions to the problem of Celtic language acquisition, it is perhaps surprising that more research has not taken place in this area. One major project which was undertaken in the years from 1994 to 1998 was initiated by Janig Stephens of the University of Wales Institute, Cardiff. This project, entitled 'Language Acquisition in Bilingual Pre-School Children in Brittany, Ireland, Scotland and Wales', was funded by the Commission of the European Union under funding for Lesser Used Languages of Europe. The project had four research centres (in Wales, Scotland, Ireland, and Brittany), each of which was charged with the responsibility for making cross-sectional and longitudinal tape recordings of children from 2 to 5 years of age. Some research papers have arisen from this enterprise in two volumes of working papers (*Teod/Teanga/Tafod* 1995, 1996). The research project also initiated an international colloquium on childhood bilingualism and the lesser used languages of Europe, which was held with the support of the Conseil Régional de Bretagne and the Conseil Général des Côtes-d'Armor in Plésidy, France in 1997. Papers from this conference, in French, English, and Spanish, were edited by Favereau (1999).

Working on another side of the Celtic languages, the Linguistics Department in University College Dublin organised the Third Celtic Linguistics Conference for May, 2000. This event was also an international one, which covered a wide range of linguistic problems. Given the

development of research in the acquisition of Celtic languages, it seemed only natural to try to bring together acquisition specialists and linguists at the same time. The conference organisers, Cathal Doherty and Máire Ní Chiosáin, enthusiastically incorporated an acquisition session into the original programme. The papers presented at this session form the basis of the current issue of the *Journal of Celtic Language Learning*. Further papers were also presented by Alison Henry of the University of Ulster on 'Language acquisition, language change and code-switching: acquiring Belfast Irish' and by Morag McNeil of Sabhal Mor Ostaig on the Isle of Skye on 'An exploratory look at acquiring competence in the concept of possession in Gàidhlig'.

Continuing the theme of broadening interests in the Celtic languages, it was then proposed to the editors of the *JCLL* that a North American readership well used to issues of second language learning might be interested in a collection of papers devoted to first language acquisition in Ireland and Wales. Muiris Ó Laoire and Nancy Stenson were most encouraging, and it has been my pleasure and privilege to work with them as 'guest editor' for this volume.

It is my belief that even the most hardened adult language specialist will find much of interest in this issue of the *JCLL*. The paper by *Borsley and Jones* (pp. 9-20) focuses on the acquisition of verb tense marking in Welsh. For adult Anglophone learners, the tense marking system of Welsh is different enough to present a learning challenge: it is instructive to see the way in which Borsley and Jones's sample of children slowly begins to develop finite clauses, alongside an extended period in which finite markers are still missing. Some related ground is touched on in the wide-ranging study by *Stephens and Richards* (pp. 35-51) of the language development of a Welsh-speaking child with a cochlear implant who was recorded between the ages of 7 and 9 years of age. Here too, we see the progress of some areas of development, most notably the determiner system, together with the phased growth of more complex systems. For *Goodluck, Guilfoyle, and Harrington* (pp. 21-33), looking at Irish, it is relative clauses which are of interest. The difference between *an buachaill a itheann úll* 'the boy that eats an apple' and *an carr a thiomáineann Neil* 'the car that Nell drives' is subtle on the surface, but vital for language learners, whether as mother tongue speakers or adult second language students; as the authors demonstrate, children can perform quite well in mastery of the relevant forms, but results can also lead to a deeper look for variation within the language itself.

Taking a somewhat different approach, which links grammar more closely to morphology and in some ways to phonology, *Gathercole,*

Thomas, and Laporte (pp. 53-87) take on the complex question of gender marking in Welsh. Any study of grammatical gender naturally invites an investigation of the relationship between 'natural' gender related to the gender of the referent, and grammatical gender as determined by the rules of the language. Arguably, the latter is more abstract and more difficult to learn, and Gathercole, Thomas, and Laporte test a variety of hypotheses which ultimately point towards the piecemeal acquisition of the gender system, balancing the conflicting demands of natural and grammatical gender as well as the different phonological systems of initial consonant mutation which help to mark gender distinctions. These results are clearly relevant to anyone who has worked with the complexities of gender marking and the initial consonant mutations for which the Celtic languages are so well known.

The current volume, which also updates the field with a review of Irish-language software packages, thus represents a confluence of interests among Celticists, first language acquisition specialists, second language teachers and learners, and others. This issue is something different for the JCLL, but it is hoped that it will constitute one further step towards the understanding of a broad range of problems in the Celtic languages and in language acquisition generally.

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THE DEVELOPMENT OF FINITENESS IN EARLY WELSH

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This paper discusses the development of finiteness in early Welsh on the basis of a large corpus of natural speech from seven children, four in the Bangor area and three in the Aberystwyth area, recorded for approximately nine months between the ages of 19 and 27 months in 1993-4 and 1996. Overall the corpus shows a gradual emergence of finiteness. The earliest clausal utterances have no finite element. Later, finite sentences and especially sentences with forms of the copula *bod* appear. However, sentences with no finite element continue to occur after the appearance of the first finite sentences. It is likely that the changes in the observed data are as much a reflection of changes in the children's processing ability as of changes in their grammar.

Introduction

A major focus of research on the acquisition of syntax has been the development of finiteness. In this paper, we will discuss the development of finiteness in early Welsh on the basis of a large corpus of naturally-occurring speech from seven children acquiring Welsh as a first language, who were recorded for approximately nine months between the ages of 19 and 27 months. Four of the children were living in the Bangor area and three in the Aberystwyth area. One of the Bangor children was recorded in 1993-4. All the other children were recorded in 1996 as part of an ESRC-financed project (grant number R/000/23/6420). We will show that the earliest clausal utterances lack finite elements and that the use of such elements develops gradually, with utterances that lack finite elements persisting after the first finite elements appear. We will also consider the implications of the data in a preliminary way.

The basic data

The corpus that we are drawing on here consists of 168 recordings as follows. As can be seen, there are just 11 recordings for one of the children, but for the other six there are 24-29 recordings. For these children, the

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earliest recording ranges from 1;6.8 to 1;8.31, while the final recordings range from 2;3.17 to 2;6.9. Thus, there are six very similar bodies of data, and this study is based on these six children.

Subject	Location	Number of recordings	First recording	Last recording
Alaw	Bangor	27	1;6.8	2;3.21
Bethan	Aberystwyth	24	1;7.28	2;4.30
Dewi	Bangor	29	1;9.21	2;6.9
Elin	Bangor	11	1;5.8	1;9.20
Mair	Aberystwyth	26	1;6.20	2;3.17
Rhian	Aberystwyth	25	1;6.17	2;3.23
Rhys	Bangor	26	1;8.31	2;5.21

The corpus shows a gradual emergence of finiteness. The earliest clausal utterances in the corpus have no finite element. We will refer to such examples as finiteless clauses. The following are representative examples:

(1) a. mochyn wneud o. (Alaw, 1;7.27)
pig do it
'The pig is doing it'.

b. hwn yn brifo. (Rhys, 1;9.12)
this in hurt
'This is hurting'.

c. pop di mynd. (Bethan, 1;10.18)
pop after go
'Pop has gone'.

d. Lisa yn tew. (Dewi, 1;10.23)
Lisa PRED fat
'Lisa is fat'.

e. bib fynna. (Bethan, 1;10.18)
bib there
'The bib is there'.

f. mam isio. (Dewi, 1;11.17)
mam want
'Mum wants'.

These examples represent a number of sub-types. Sentence (1a) consists of a subject, a non-finite verb (a verb-noun in traditional terminology), and possibly a complement. Examples (1b) and (1c) consist of a subject, what we will refer to as an aspectual particle, *yn* 'progressive' and *(we)di* 'perfect', a non-finite verb, and possibly a complement. Sentence (1d) consists of a subject, the predicative particle *yn*, and a predicative adjective. Example (1e) consists of a subject and an adverbial (commonly a locative as in (1e)), either an adverb or prepositional phrase. Finally, (1f) consists of a subject, the noun *isio* 'want', and possibly a complement of some kind.

Simple sentences with a finite lexical verb are quite rare. One of the few examples is (2) below. This rarity may reflect the fact that such sentences are rare in the adult Welsh spoken in the children's environment. However, we have not investigated this. Lexical verbs are quite common in imperatives such as (3), but it is not clear whether they are finite.

(2) aethon ni Dan-Ogof. (Rhian, 2;1.23)
went.1PL we Dan yr Ogof
'We went to Dan yr Ogof'.

(3) rheda! (Bethan, 1;7.28)
run.IMP.2SG
'Run!'

The main examples of clearly finite elements in the corpus are auxiliary verbs and especially forms of the copula *bod;* they gradually become more frequent in the data. The following are representative examples:

(4) a. mae lori yn mynd. (Rhys, 1;10.18)
is lorry in go
'The lorry is going'.

b. ma Postman Pat di disgyn. (Bethan, 1;11.15)
is Postman Pat after fall
'Postman Pat has fallen'.

c. mae hwn yn styc. (Rhys, 2;2.15)
is this PRED stuck
'This is stuck'.

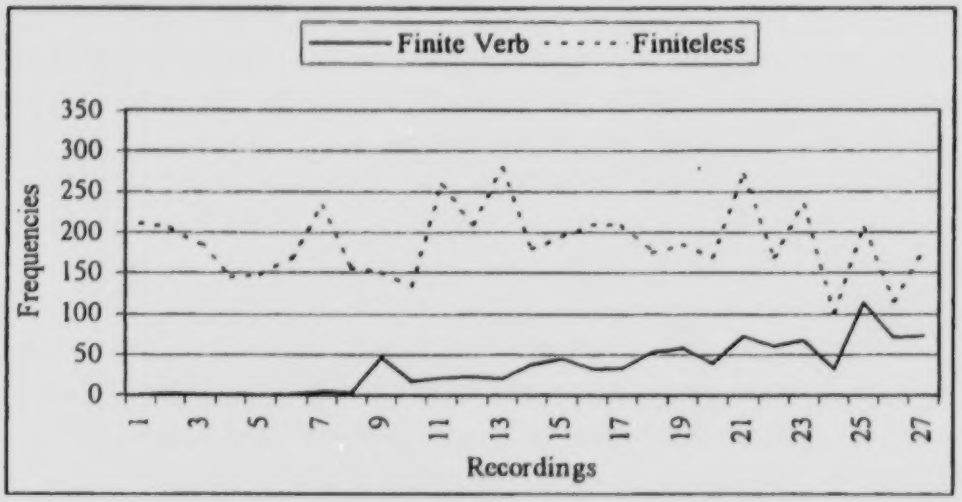
d. mae Sammy yfana. (Dewi, 2;2.3)
is Sammy there
'Sammy is there'.

e. dw i isio gadael nhw. (Alaw, 2;0.29)
am I want leave them
'I want to leave them'.

Examples (4a) and (4b) are so-called periphrastic sentences, while (4c) is what we might call a predicative sentence. We shall call (4d) a locative sentence. Finally, (4e) is what we shall call an *isio* sentence. An important point to note is that the examples in (4) are essentially the earlier examples in (1b–f) with the addition of a form of the copula.

Graphs 1 to 6 show the longitudinal development of finite and finiteless clauses in raw frequencies. Three points can be made. First, there is an uneven distribution of frequencies from one recording session to the next. But this should not surprising, as the quantity of linguistic activity is bound to vary per half hour in the daily lives of children.

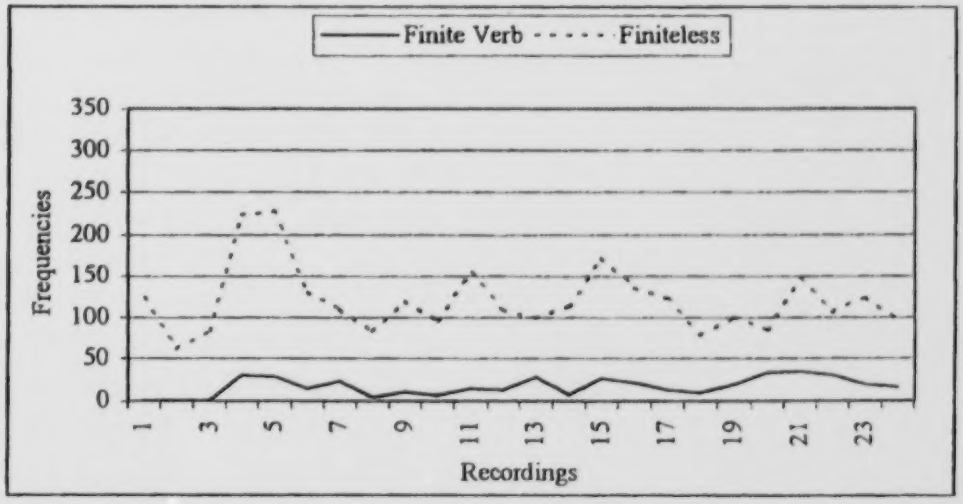
Graph 1: Finite and Finiteless — Alaw



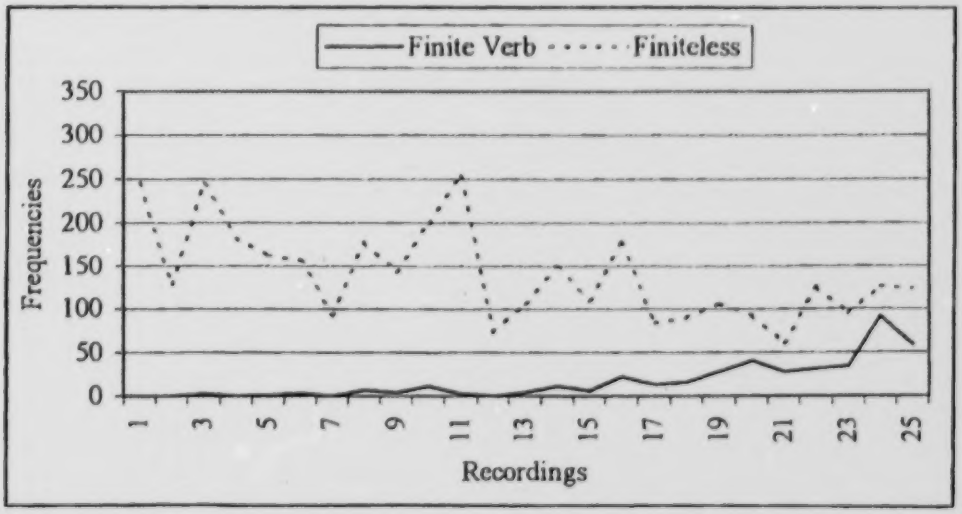
Second, the longitudinal development of finiteness varies with individual children. In this corpus, Rhys in Graph 5 and Bethan in Graph 2 represent two extremes. The former shows an increase of finite clauses over the period of his recording sessions, but the latter's use of finite clauses remains consistently low. The other four children come within these two extremes, with Dewi (Graph 6) and Alaw (Graph 1) approximating to the progress of

Rhys, and Rhian (Graph 3) and Mair (Graph 4) beginning to show signs of an increase in the use of finite verbs by the end of their recording periods.

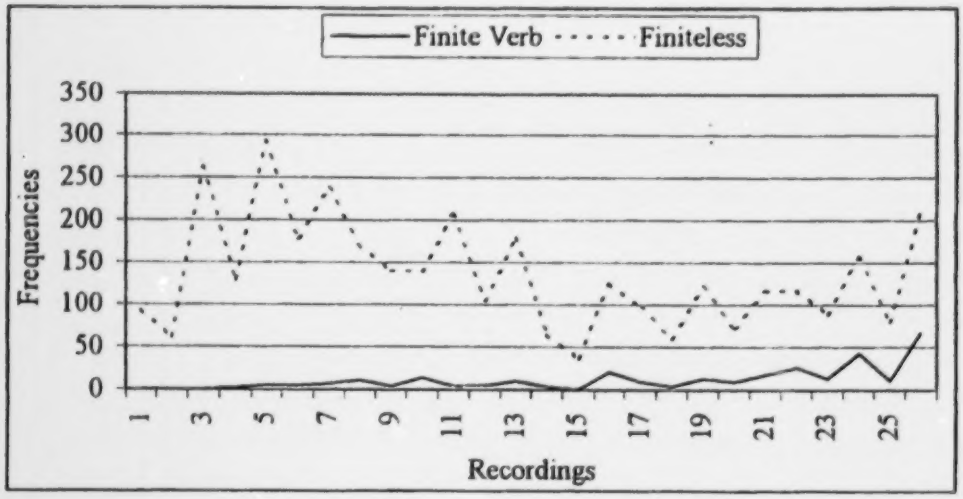
Graph 2: Finite and Finiteless —Bethan



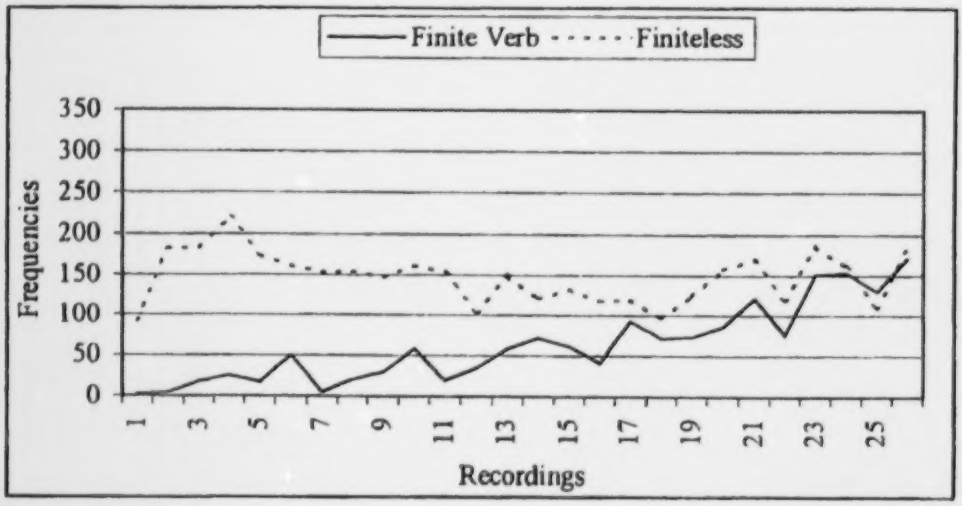
Graph 3: Finite and Finiteless — Rhian



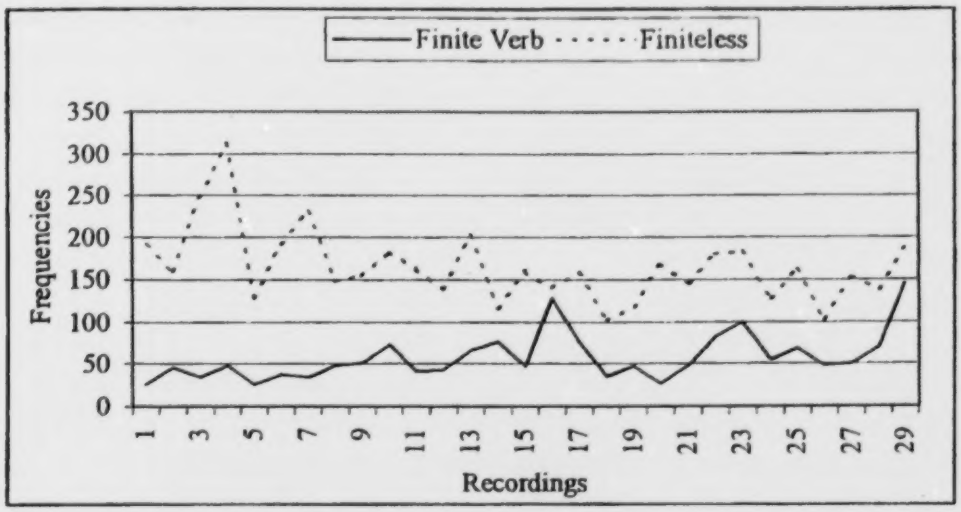
Graph 4: Finite and Finiteless — Mair



Graph 5: Finite and Finiteless — Rhys



Graph 6: Finite and Finiteless — Dewi



Third and most important, the graphs show that, even for those children where there is a clear increase in finite clauses, sentences with no finite element do not disappear once the former begin to emerge: examples like those in (1a–f) are still found in transcriptions at the end of the recording period. Here are some late examples of such sentences:

(5) a. Lisa dwyn nhw. (Dewi, 2;5.23)
Lisa take them
'Lisa took them'.

b. dyn yn mynd ar eliffant. (Rhys, 2;5.21)
man PROG go on elephant
'The man is going on the elephant'.

c. Sam Tan wedi cal panad. (Bethan, 2;4.23)
Sam Tan after get cup-of-tea
'Sam Tan has had a cup of tea'.

d. ti 'n iawn? (Bethan, 2;4.16)
you PRED okay
'Are you okay?'

e. car Gwenan fynna. (Mair, 2;3.17)
car Gwenan there
'Gwenan's car is there'.

f. fi isio un arall. (Alaw, 2;3.17)
I want one other
'I want another one'.

Discussion

The obvious questions to ask about our data are: how do the children's grammars differ from those of adults? and how do they develop during the period covered by the corpus? We cannot at present provide definitive answers to these questions, but we can offer a number of tentative conclusions.

As we have noted, a central feature of our data is the persistence of sentences with no finite verb after the first appearance of finite sentences. This has been a major concern of work on the acquisition of syntax over the last ten years, where it has been observed that children acquiring many languages continue to use so-called 'root infinitives' after they have begun to produce adult-like finite clauses. The following examples from Wexler (1994) are typical root infinitives:

(6) la poupe dormir. (French)
the doll sleepINF

(7) ich der Fos hab'n. (German)
I the frog haveINF

(8) pappa schoenen wassen. (Dutch)
father shoes washINF

In all three examples the only verb is an infinitive. For discussion of such examples, see Wexler (1994, 1996), Rizzi (1994), Phillips (1995), and Lasser (1997).

The examples in (1a) and (5a) look very much like typical root infinitives. However, others do not, some because they contain not just a verb-noun but the combination of an aspect marker and verb-noun, (1b–c, 5b-c) which might be called an aspectual phrase, others because they do not contain any verbal element, (1d-f, 5d-f). It seems to us that the literature on root infinitives is of limited relevance here, but space constraints prevent us from exploring this matter. As we have noted, these examples look a lot like sentences with an initial copula, except that they do not contain the copula. We might call them missing copula sentences.

An important fact that we should note here is that sentences with a missing copula are not uncommon in adult Welsh. They occur with certain pronominal subjects, especially *ti* 'you(SG)', *ni* 'we' and *chi* 'you(PL)'. They are also found with *fi* 'I' and *nhw* 'they' in the speech of some speakers of southern dialects. These sentences can contain the full set of predicates considered earlier. Thus, we have examples like the following:

(9) a. Ti 'n gadael.
you(SG) PROG leave
'You're leaving'.

b. Ti 'n hwyr.
you(SG) PRED late
'You're late'.

c. Ti yn y pentref.
you(SG) in the village
'You are in the village'.

d. Ti isio diod?
you(SG) want drink
'Do you want a drink?'.

These sentences do not occur as commonly with other sorts of subject. Hence the adult data is different from the child data. It is not so different, however, as one would think if one overlooked examples like those in (9).

An important point about these examples in adult Welsh is that there is evidence that they are finite clauses. They take the same tag questions as ordinary finite clauses, and they can be embedded in the same contexts as ordinary finite clauses. The following sentences illustrate these points:

(10) (Wyt) ti 'n gadael, ynd wyt.
are-2SG you(SG) PROG leave Q+NEG are-2SG
'You're leaving, aren't you?'

(11) Dw i'n meddwl (wyt) ti 'n gadael.
am I PROG think are-2SG you(SG) PROG leave
'I think you're leaving'.

How should such adult examples be analysed? An obvious suggestion in various frameworks is that they involve a phonologically null form of

the copula. Thus, (9a) might have an analysis along the following lines:

(12) [S [V e] [NP ti] [AspP 'n gadael]].

What about the children's missing copula sentences? A null copula analysis is not very plausible at an early stage when they show no signs of having overt forms of the copula. At this stage we presumably have 'small clauses' with just a subject and predicate of some kind with no finite element. Thus, (1b) probably has the following structure:

(13) [S [NP hwn] [AspP yn brifo]]

However, at a later stage, when they begin to use overt forms of the copula, a null copula analysis may well be appropriate. Clearly further research is necessary here.

We should say something here about examples like those in (1a) and (5a), which do not resemble adult sentences. We would suggest that these are essentially a variant of the examples in (1b) and (5b) that contain *yn*. They seem to convey the same meanings as examples with *yn*. Moreover, we have some examples in the corpus of sentences containing the copula, a subject, and a non-finite verb with no preceding aspectual particle, for example the following:

(14) a. mae lori ffitio. (Alaw, 2;2.12)
is lorry fit
'The lorry fits'.

b. mae o gweithio rwan. (Dewi, 2;3.17)
is he work now
'He is working now'.

c. ma' car mynd yn garej. (Rhian, 2;3.2)
is car go in garage
'The is going into the garage'.

d. mae hwn mynd i lawr. (Rhys, 2;3.26)
is this go up
'This is going up'.

It is also worth noting that there is one situation in the adult language in which *yn* disappears. Parallel to (15a), we have not (15b), as we might

expect, but (15c).

(15) a. mae Gwyn yn canu.
is Gwyn in sing
'Gwyn is singing'.

*b. Yn canu mae Gwyn.
in sing is Gwyn.

c. Canu mae Gwyn.
sing is Gwyn
'Singing Gwyn is'.

It seems to us, then, that the examples in (1a) and (5a) can probably be assimilated to the examples in (1b) and (5b).

It seems quite likely that there are changes in the grammars of the children during the period covered by the database. It seems to us, however, that the main changes in the observed data are probably a result of the children's growing processing ability. A missing copula sentence obviously contains one less lexical item than a related sentence with an overt form of the copula. Thus, given the reasonable assumption that it is difficult for young children to produce sentences of more than a few words, it is likely that they will produce more missing copula sentences than adults. Moreover, given the reasonable assumption that young children's ability to produce complex sentences increases over time, it is likely they will produce fewer missing copula sentences and more sentences with an overt form of the copula. It seems to us, then, that the changes in the observed data are probably in part a reflection of changes in the children's processing ability. Clearly, however, further research is needed here.

Conclusions

We have been concerned in this paper with the development of finiteness in early Welsh as it appears in a corpus of natural speech from seven children recorded between the ages of 19 and 27 months. We have outlined the basic facts and also looked in a preliminary way at their implications. We have emphasized the fact that the earliest clausal utterances have no finite element and that such utterances continue to occur after the appearance of utterances with a finite element. We have also speculated that the changes in the observed data are in part a reflection of changes in the

children's processing ability.

Much remains to be done. In particular we need to look in more detail at both finite and finiteless sentences. In the case of the latter, we hope that it may be possible to determine whether different analyses are appropriate for early and late examples, at least with some of the children. We also need to investigate the possible role of processing ability more carefully. Finally we need to consider the implications of the data for proposals about 'root infinitives'.

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ACQUIRING SUBJECT AND OBJECT RELATIVES: EVIDENCE FROM IRISH

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Many experimental studies have suggested that children acquiring various languages have more difficulty with relative clauses in which the head refers to the object position than those in which the head refers to the subject position. However, there is also some spontaneous speech evidence that object relatives may be acquired slightly before subject relatives. We report here on the acquisition of subject and object relative clauses by native Irish speaking children from Kerry. We show that while the children did produce some non-adult forms, they had adult-like control of both subject and object relatives. We discuss our study in the context of debates concerning whether a pronominal binding or a movement mechanism for relative clause formation has priority in first language acquisition.

Introduction[1]

Relative clause formation has been the topic of intensive research in grammatical theory and language acquisition by children. In this paper, we focus on the distinction between relative clauses in which the head noun (*man* in the examples below) refers to the subject position in the relative clause as shown in (1), and relative clauses in which the head refers to the object position as shown in (2).

(1) Sue met the man who/that __ telephoned Fred.

(2) Sue met the man who/that Fred telephoned __ .

Beginning with Keenan and Comrie (1977), research on the grammar of

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many different languages has shown that relatives of the type in (1) are a very common type of relative clause, although the possibility of reference between the head and the subject position is excluded in some cases, including one type of relative in Modern Irish (see below). Consistent with this, recent studies of elicited production of relative clauses by preschool children show a greater facility in producing subject as opposed to object relative clauses (see Labelle 1991 and Fragman in press a, b for studies of French-speaking children and Goodluck and Stojanović 1996 for a study of Serbo-Croatian speaking children). Moreover, the literature on language comprehension by preschoolers supports the view that subject relatives are correctly comprehended, when extraneous factors are controlled for (for example, Goodluck and Tavakolian 1982). A superficially surprising finding, then, is that in spontaneous speech, two to three year-old children acquiring English have been reported to produce object relatives as their first relative clauses, subject relatives following a little later (Limber 1973, Goodluck 1997).

A basic goal of the Goodluck (1997) study was to examine whether the emergence of object relatives before subject relatives in spontaneous speech could be explained by a stage in language acquisition in which children temporarily hypothesise a grammar in which subject relatives are not permitted, in other words, a stage in which the child learning English (or any other language in which subject relatives are not restricted) formulates a grammar similar to Modern Irish, which restricts subject relatives. In addition to the lag in the use of subject relatives in children's spontaneous speech, the existence of such a non-adult stage finds support from the elicited production studies of Labelle and Goodluck and Stojanović cited above. They report that the non-adult relatives produced by children in their study implicate the same grammatical mechanism (pronoun binding, see below) that Irish uses in the instances where subject relativization is blocked (but see Fragman in press a, b and Guasti and Shlonsky for dissenting views).

Modern Irish Relatives

Modern Irish has two types of relative clauses, traditionally referred to as Direct and Indirect relatives. A Direct relative has a gap at the relativization site, whereas in the Indirect Relative a resumptive pronoun occupies the relativization site. These two relative clause types are further distinguished by different forms of the relative complementizer, and by different mutation effects on the verb following the complementizer. The

complementizer that introduces a relative clause with a gap at the relativization site is usually referred to as *aL* (where *L* stands for the leniting effect on the following verb). The complementizer that introduces a relative clause containing a resumptive pronoun is usually referred to as *aN* (where *N* stands for the nasalization effect on the following verb). The syntactic conditions on the appearance of these different types of relatives are complex, and subject to substantial dialectal (and even individual) variation (see McCloskey 1979, to appear for discussion). Here we restrict ourselves to looking at simple relative clauses in Munster (Kerry) Irish, in other words, relative clauses in which the relativization site is a main clause, rather than an embedded clause. In simple clauses, subject relatives are formed with a gap at the relativization site, whereas object relatives can be formed using either a gap or a resumptive pronoun.[2] This is summarized in Table 1 below, and illustrated by the example sentences showing *subject* relatives in (3) and *object* relatives in (4).

Table 1. Irish subject and object simple relatives

	Complementizer	Extraction Site	Foot of Chain
Direct	*aL*	Subject/Object	Gap
Indirect	*aN*	Object	Resumptive pronoun

(3) a. an buachaill a itheann úll.
the boy aL eat-PRES apple
'the boy that eats an apple'.

*b. an buachaill a n-itheann sé úll.
the boy aN eat-PRES he apple
'the boy that eats an apple'.

(4) a. an carr a thiomáineann Neil ar scoil gach lá.
the car aL drive-PRES Nell to school every day
'the car that Nell drives to school every day'.

b. an carr a dtiomáineann Neil ar scoil gach lá é.
the car aN drive-PRES Nell to school every day it
'the car that Nell drives to school every day'.

2. In everyday speech object relatives are usually formed with a gap at the relativization site, except where this would result in ambiguity. See McCloskey (1979: 7) for discussion.

In these examples, we see that for the subject relative in (3a) only the complementizer *aL* combined with a gap is acceptable. The object relatives in (4) allow both *aL* with a gap in object position, and *aN* with a resumptive pronoun in object position.[3] On the analyses of McCloskey (1979) and Duffield (1995), the difference between the two types of relatives is accounted for in terms of different syntactic mechanisms: *aL* relatives are formed by an abstract movement operation, illustrated schematically in (5), and the gap position is occupied by a phonetically null category, trace. By contrast, *aN* relatives are formed by a pronominal binding operation, as illustrated in (6):

(5) [Head NP_i [O_i [V ... t_i .....]]] (O = abstract relative operator)

(6) [Head NP_i [O_i [V ..... $pronoun_i$....]]].

The proposal that these two different mechanisms are involved can be used to explain the ungrammaticality of *aN* relatives with relativization of the subject position. A definite pronoun, such as the resumptive pronoun found in *aN* relatives, may not be syntactically too close to the NP it refers to. On this account, (3b) is ungrammatical for the same reason (too close proximity to the head NP it refers to) as a sentence such as ***John hit him*** (with *John* and ***him*** construed as the same person) is ungrammatical. That is, on an account such as McCloskey's, the ungrammaticality of (3b) is a consequence of Binding Theory, in the general sense of Chomsky (1981).

Hypotheses and predictions for first language acquisition

As mentioned in the Introduction, it has been proposed that the earlier emergence of object relatives in English child language acquisition might be explained as the result of a stage where subject relatives are restricted, even when the adult grammar of the language does not have any such restriction. In other words, children learning a language such as English might go through a stage in which they temporarily entertain a grammar like that of adult Irish. This putative stage would be one reflection of the general tendency argued for by some authors for children to prefer a non-movement mechanism for relative clause formation. It is possible to hypothesise therefore that object relatives may arise before subject relatives

3. An additional complication is that in Kerry *aN* is usually replaced by the complementizer *go* (McCloskey, to appear). This point is discussed further below.

in Irish, given that the adult grammar of Irish restricts matrix subject relatives to *aL* relatives only. We designed an experiment to test this prediction. The experimental task aims to elicit subject and object relatives. In addition to allowing us to test whether one relativization site is easier than the other for children, we planned to examine the data for the following characteristics:

a. Relative frequency of *aN* vs. *aL* forms compared to an adult control group

b. Presence of syntactic characteristics associated with pronominal binding relatives cross-linguistically. These include the use of resumptive pronouns and the use of an invariant complementizer/ relative particle to introduce the relative clause (see the Labelle and Goodluck and Stojanović studies cited above and references therein).

Experiment

Task and materials

We used an elicited production task modelled on Labelle (1991) and Goodluck and Stojanović (1996). The goal is to present the subjects with a stimulus to which the normal response will be a relative clause of a particular type. To this end, each subject was shown pairs of pictures in the presence of a blindfolded soft toy, and given a 1p and a 5p coin. Each picture pair contains similar or identical characters or objects. The subject was asked to place one coin on the character/object on each picture, and then to tell the toy where s/he has placed a specific coin. The sample protocols shown in (7) and (8) show how subject and object relatives were elicited using this methodology. Each subject responded to three pairs of pictures designed to elicit subject relatives and three designed to elicit object relatives, as part of a larger battery of test conditions (see Appendix for examples of the pictures described in (7) and (8)).[4]

4. In addition to the simple subject and object relative conditions described here, we tested relativization of prepositional object position, negated clauses, past tense simple relatives, and present tense subject and object relatives in which the relativization site is in an embedded clause. The results are discussed in Goodluck, Guilfoyle, and Harrington (in preparation).

(7) Sample Subject Probe

The subject is shown a pair of pictures depicting: (a) a boy running with a schoolbag on his back, and (b) a boy eating an apple.

Experimenter's script:

(a) Téann an buachaill seo ar scoil gach lá.
go-PRES the boy DEMONST to school every day
'This boy goes to school every day'.

(b) Itheann an buachaill seo úll ag am lóin.
eat-PRES the boy DEMONST apple at time lunch
'This boy eats an apple at lunch time'.

Instructions: the subject is asked to put one coin on each boy, and asked where the 1p/5p is.

(8) Sample Object Probe

The subject is shown a pair of pictures depicting: (a) a girl clean ing a car, and (b) a girl driving a car

Experimenter's script:

(a) Glanann Neil an carr seo gach Satharn.
Clean-PRES Nell the car DEMONST every Saturday
'Nell cleans this car every Saturday'.

(b) Tiomáineann Neil an carr seo ar scoil gach lá.
drive-PRES Nell the car DEMONST to school every day
'Nell drives this car to school every day'.

Instructions: The subject is asked to put one coin on each car, and asked where the 1p/5p is.

Subjects

We report here on the performance on the conditions illustrated in (7) and (8) of 12 adults and 13 child native speakers from the Kerry Gaeltacht. The children ranged in age from four years, nine months (4;9) to 8;5

years.[5]

Results

Table 2 below gives the number of relative clauses elicited for these children and adults.

Table 2. Number of subject and object relatives produced

	Subject relatives	Object relatives
Adults	38 (39)	23 (23)
Children	37 (32)	32 (30)

The numbers in parentheses in Table 2 are the number of responses in which the target relativization site and the site in the response coincided, i.e., the number of times that a subject relative was produced in response to a subject probe such as the sentence in (7) and an object relative was produced in response to an object probe such as the sentence in (8). The close correspondence between the pairs of numbers shows that both children and adults produced mostly subject relatives in response to subject probes and object relatives in response to object probes. In terms of the type of relative produced (formed with gaps or resumptive pronouns), adults overwhelmingly preferred to use relatives formed with a gap: 100% of their subject relatives were formed with a gap (as the grammar dictates), as were 100% of their object relatives. No adult produced object relatives with *aN*.[6] The examples of subject relatives shown in (9) and of object relatives in (10) are typical of the relative clause data produced by children and adults:

(9) a. Ar an mbuachaill a itheann úll.
on the boy aL eat-PRES apple
'On the boy that eats an apple'. (Adult Control 3)

5. An additional 24 children have been tested. A cursory inspection of the data from these children does not suggest any conclusions different from what we report here.

6. One additional L_1 Irish adult has been tested, whose background is not the Kerry dialect; this individual did produce *aN* object relatives with resumptive pronouns.

b. Ar an bhuachaill a itheann an úll.
on the boy aL eat-PRES the apple
'On the boy that eats the apple'. (Subject 15: age 6;10)

c. Ar an bhuachaill a théann ar scoil.
on the boy aL go-PRES to school
'On the boy that goes to school'. (Subject 16: age: 8;4)

(10) a. Ar an rothar a dheisíonn Daid.
on the bicycle aL fix-PRES Dad
'On the bicycle that Dad fixes'. (Adult Control 4)

b. Ar an rothar a ghlanann sé.
on the bicycle aL clean-PRES he
'On the bicycle that he cleans'. (Subject 15: age 6;10).

Some further points about the data deserve note. First, in spite of the fact that the adults produced no resumptive pronouns in their object relatives, we know that they do have access to a resumptive pronoun strategy for relative clause formation. This is because in other conditions in this study (see footnote 4) we probed for relativization of the object of preposition position, for which a resumptive pronoun is the only option in the adult grammar, and in this case all adults produced resumptive pronoun relatives, as illustrated by the example in (11):

(11) ar an mbord go gcoimeádann Mam na h-úlla air.
on the table REL keep-PRES Mammy the apples on+it
'On the table that Mammy keeps the apples on'.

Second, not all the child, or even adult, productions conform to the relative clause pattern described in Table 1. Note first that one adult produced three relatives with *go* and no resumptive pronoun in response to the object probes; these are not included in the totals in Table 2, because it is unclear if the intended structure was a direct object relative or an oblique relative or complement to N. Moreover, a few child productions of *aL* relatives did not include correct mutation (as illustrated in 12). Strikingly, two children produced *go* in both subject relatives as in (13) and in object relatives illustrated by (14).

(12) ar an rothar aL socraíonn sé.
on the bicycle REL repair-PRES he
'On the bicycle that he repairs'. (Subject 24: age 5;5)

(13) a. ar an Mamaí go osclaíonn an doras.
on the Mammy COMP open-PRES the door
'On the Mammy who opens the door'. (Subject 25: age 5;3)

b. Ar an duine go léim suas.
on the person COMP jump-PAST up
'On the person that jumped up'. (Subject 22: age 4;8)

(14) a. ar an rothar go deisíonnn Daid.
on the bicycle COMP mend-PRES Daid
'On the bicycle that Dad mends'. (Subject 35: age 5;6)

b. an liathróid go caitheann an buachaill.
the ball COMP throw-PRES the boy
'The ball that the boy throws'. (Subject 35: age 5;6)

c. an ceann go péinteálann Daid.
the one COMP paint-PRES Dad
'The one that Dad paints'. (Subject 25: age 5;3)

Readers familiar with Kerry Irish will be aware that in this dialect, *go* is frequently used instead of *aN* in relatives with a resumptive pronoun. Thus the *aN* example in (4b) is commonly encountered as (15) in Kerry:

(15) an carr go dtiomáineann Neil ar scoil gach lá é.
the car COMP drive-PRES Nell to school every day it.
'The car that Nell drives to school every day'.

The syntactic conditions under which *aN* and *go* appear in Kerry Irish are well beyond the scope of this paper, however it should be noted that in the adult grammars, while *go* can appear with a resumptive pronoun, it does not appear with a gap at the extraction site as in the child subject and object relatives of (13) and (14) above. Nor to our knowledge is *go* ever used in subject relatives (Ó Sé 2000; McCloskey, to appear).

Discussion

Plainly, there is little evidence in our data that the grammar of simple subject and object relatives differs for Irish-speaking children and adults. No difficulty was found with subject relativization on the part of children,

as we hypothesised might be the case if children learning Irish initially do not have access to the *aL*/gap relativization strategy. Of course, the children we have tested are relatively old, and there may well be stages of development that we have missed.

There are in any case two separate hypotheses to be examined: whether children adopt a pronominal binding analysis for relativization early on, and whether the particular binding analysis adopted is of the type used in adult Irish, blocking relativization of the subject position. We do have evidence from the two children who produced relatives introduced by *go* of children innovating in a way that cannot be attributed directly to the model of the adult language.[7] As mentioned above, use of an invariant complementizer to introduce relatives has been taken as an index of use of a pronominal binding strategy. However, we believe it is worth re-examining this notion. The use of a complementizer could also be for the child a signal of subordination that fits with the restrictive use of a relative clause. Our test was set up to elicit restrictive relative use: use of the relative to identify one member of (in our case) a two-member set. Restrictive relatives in a language such as English are syntactically subordinated to the head NP (as opposed to non-restrictive, parenthetical, relatives, which are quite loosely connected to the syntax of the main clause; see for example Safir 1986). In sum, from our data, we see on the one hand clear evidence of competence in relative clause production by 4 to 7 year old Irish-speaking children, with subject and object relatives being produced with equal facility by most of the children tested; on the other hand, there are intriguing hints of early stages of development that have the potential to inform ongoing debates concerning general issues in the ontogeny of relative clause formation.

7. Another area in which children's performance is not adult-like in our test is negative relative clauses (see footnote 4 above). None of the 13 children we report on produces the adult form of the negative complementizer. Space does not allow further elaboration here, but see Goodluck, Guilfoyle, and Harrington (in preparation) for further discussion.

Appendix

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THE LANGUAGE DEVELOPMENT OF A WELSH-SPEAKING CHILD WITH A COCHLEAR IMPLANT

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Hearing impairment in young children can cause severe reduction in oral/aural input in the critical period for language acquisition. The subject of this study became deaf at 18 months and received a cochlear implant two years later, aged 3 1/2. This caused a delay in renewed onset language development post cochlear implant. The child was recorded for nearly three years and the data analysed to evaluate his progress in the acquisition of the functional systems: the D-system, the I-system, and the C-system. The three functional systems have emerged but the C-system is still incomplete.

Introduction: language acquisition

Language acquisition under normal circumstances is well documented, and it is recognized that by the age of three, children have acquired the key grammatical features of their first language. However the language acquisition process can be seriously affected if special circumstances modify the child's linguistic environment.

Loss of hearing is a selective impairment, which can greatly and in some cases totally reduce the auditory language input. The majority of children suffering from severe hearing loss have no other pathology and present no learning difficulties beyond their hearing loss. While deaf children exposed to a sign language from birth follow patterns of language development similar to children acquiring a spoken language (Bellugi, van Hoek, Lillo-Martin, and O'Grady 1993), language delay is observed in hearing-impaired children exposed to oral/aural input. Their language development varies according to the type of deafness — congenital or acquired, pre-lingual or post-lingual — and the degree of residual hearing. Bamford and Mentz's (1979) extensive study showed that language development in hearing-impaired children follows the same sequences as in normally hearing children but at a somewhat reduced pace, and the delay may become so marked that these children may never attain full language competence (De Villiers, De Villiers, and Hoban 1994).

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Children suffering from hearing loss can benefit from traditional hearing aids, but in the last 20 years new technologies have resulted in the development of new rehabilitative procedures involving direct stimulation of the cochlear nerve by cochlear implants bypassing the abnormal hair cells in the inner ear. This has now become a standard procedure in most developed countries with some 700 children having received cochlear implants in the UK and 40 in Wales, four of whom are Welsh speaking.

The conditions under which children with cochlear implants acquire language are markedly affected both by the age of exposure to auditory linguistic input and by the quality of that input. There is some evidence that children with cochlear implants are capable of acquiring vocabulary at a relatively fast rate (Willis and Edwards 1996). However Curtiss (1989) points out that a distinction ought to be made between the ability to acquire vocabulary and use it in multi-word utterances and the ability to construct sentences with full a grammatical structure.

The following examples collected in a South Wales clinic are not atypical of children with cochlear implants even a few years after the operation. Sentences (1) and (2) are from a child aged 10 years and eight months (10;8) with a hearing age of 4, having received a cochlear implant at 6;8, while (3) and (4) are from a 4;6 year old who received a cochlear implant at 3;6.

(1) The man jump the horse.

(2) Man climb help cat, frightened house.

(3) Sophie not feeling well.

(4) Sophie, Mummy piggyback upstairs.

Both children are lacking essential grammatical categories such as tense and agreement, even determiners and pronouns are not used systematically, and names are frequently preferred to personal pronouns. These children also show difficulties in constructing interrogatives and subordinate clauses.

However, children with cochlear implants seem to be at an advantage compared to other profoundly deaf children with hearing aids. Spencer, Tye-Murray, and Tomblin (1998) found that they were using grammatical inflections in greater number than the children with hearing aids. Grammatical inflections are essential to the grammaticality of sentence and phrasal structures.

Most of the research on the language development of children with cochlear implants has concentrated on speech recognition and production and very little on the grammatical structure of their language. Coerts and Mills (1996) found that children who had lost their hearing after the age of three made greater progress in their development of language after implantation than those who had become deaf before the age of three, confirming a widely held view of a critical period for optimal language development, (Lenneberg 1967, Curtiss 1977).

Many of the children who have received a cochlear implant have experienced a period of profound deafness and thus have been denied continuous early exposure to adequate spoken auditory language input. Children acquiring language under normal circumstances have acquired the essential grammatical structures of language by the age of three. Prelingually deaf children receiving a cochlear implant after the age of three have missed out on that critical first period of language acquisition. One of the questions to be addressed is how this deprivation of input in the early years affects the language acquisition process.

The present case study of a Welsh-speaking child has been undertaken with the aim of assessing his linguistic development over a two and a half year period and of determining whether progress follows the same pattern as for children acquiring language under normal circumstances. The rest of the paper is organised as follows. The first section outlines the relevant aspects of the Welsh language within the Principles and Parameters Approach (Chomsky 1995). It is followed by the method section, the analysis of the results and discussion, and the conclusion.

Linguistic analysis

In the Principles and Parameters Approach, lexical categories are divided into two groups: contentives (nouns, verbs, adjectives, adverbs, and prepositions — items with full lexical content) and functors or grammatical items which have no or little lexical semantic content but which are essential to the grammaticality of the sentence. Functors can be either independent or free morphemes such as pronouns and auxiliary verbs or inflectional or bound morphemes such the plural *-s* of nouns or the past tense *-ed* ending of verbs in English. It is the development of grammar reflected in the use of functional categories which seems to cause the greatest difficulties for children with hearing impairment (De Villiers and De Villiers 1994).

The structure of Welsh

Functional categories in Welsh

Functional categories are grouped in three major systems: the D-system (Determiner system) associated with the noun phrase, the I-system (Inflectional-system) associated with the verb, and the C-system (Complementizer-system) associated with the clause.

The D-system

The Determiner system of Welsh includes the article, the genitive construction, and the pronouns. The definite article *y* is realized as *yr* if preceding a vowel and reduced to a weak *r* which cliticizes onto the preceding word if it ends in a vowel such as *mae* 'is' (the 3rd person present tense form of *bod* 'be').

(5) yr afal.
the apple

(6) y ci.
the dog

(7) Mae'r ci yma.
is+the dog there
'the dog is there'.

There is no genitive morpheme and possession is marked by word order only, with the possessed noun phrase preceding the possessor.

(8) car Meiron.
'Meirion's car'.

Subject pronouns are retained in colloquial Welsh in spite of the rich subject-verb agreement morphology. Welsh pronouns show person and number distinctions and an additional masculine/feminine distinction for the 3rd person. There is no nominative/accusative distinction.

(9) Mae hi yma.
is she here
'She is here'.

The Welsh clause and the I- and C-systems

The Welsh I-system divides into tense and agreement. The agreement is richer than in English, with a different inflection for each person. The past tense morpheme is *-odd* but in spoken Welsh there is no other tense distinction carried by a bound morpheme.

(10) Gwelodd Tomos geffyl yn yr ardd.
Saw Tomos horse in the garden
'Tomos saw a horse in the garden'.

There is no modal system comparable to the English one, and the main auxiliary verb is *bod* 'be'. It is referred to as copula *bod* in Jones and Thomas (1977) although it has an important function as the main auxiliary in Welsh sentences. There are various subtypes to the copula as the result of tense and person contrast and distribution, some of which are illustrated below.

VSO structures

Welsh is a VSO language and there is no variation in the word order of the three main clause types, but the auxiliary *bod* has a declarative, an interrogative, and a negative finite form for each clause type.

(11) Mae Tomos yn mynd. [Declarative]
is Tomos ASP go.
'Tomos is going'.

(12) Ydy Tomos yn mynd? [Interrogative]
is Tomos ASP go
'Is Tomos going?'

(13) Dydy Tomos ddim yn mynd. [Negative]
is+NEG Tomos NEG ASP go
'Tomos is not going'.

Non-VSO structures

Non-VSO sentences include interrogatives and focused constructions; they are similar in structure, and the morphological realization of *bod* in both constructions is linked to the category of the preceding constituent.

Interrogatives	*Focused*
(14) a. Pwy sydd yn yr ardd? who is in the garden 'Who is in the garden?'	(14) b. Tomos sydd yn yr ardd. Tomos is in the garden 'Tomos is in the garden'.
(15) a. Pwy yw hwn? who is this 'Who is this?'	(15) b. Tomos yw hwn. Tomos is this 'It's Tomos'.
(16) a. Ble mae Tomos ? where is Tomos 'Where is Tomos?'	(16) b. Yn yr ardd mae Tomos. in the garden is Tomos 'Tomos is in the garden'.

If the fronted constituent is an indefinite subject, *bod* 'be' is realized as *oes*:

(17) Oes bara ar y bwrth?
is bread on the table
'Is there bread on the table?'.

In addition to the morphological variations of the verb associated with the I-system, there are other functor elements — two conveying aspect (the progressive particle *yn* and the perfective *wedi*), and another particle *yn* used in predicative structures:

(18) Mae Tomos yn mynd. [Progressive *yn*]
is Tomos PROG go
'Tomos is going'.

(19) Mae Tomos wedi mynd. [Perfective *wedi*]
is Tomos PERF go
'Tomos has gone'.

(20) Mae Tomos yn ifanc. [Predicative *yn*]
is Tomos PRED young
'Tomos is young'.

Welsh language acquisition: normal and experimental circumstances

The first results of the studies on language acquisition by Aldridge, Borsley, and Clack (1995) and by Borsley and Jones (1997) indicate that

monoglot Welsh-speaking children follow the patterns identified by Radford (1990), with three stages: (1) an acategorial stage, (2) a lexical stage, and (3) a functional stage. The first stage is the stage of single word utterances which cannot be assigned to any word class. In the second stage words can be identified as belonging to one of the four main categories from their morphological features, for instance, plural endings for nouns. The early multiword utterances have the structure of Small Clauses consisting of a subject and a predicate, but also including many instances of missing subjects. The third stage is marked by the emergence of the functional categories: the D-system, the I-system, and the C-system. Evidence is both morphological (inflection) and structural (clause type). Radford (1996) views language development under normal circumstances as a structure-building process, ordered in such a way that the D-system emerges first, followed by the I-system and completed by the development of the C-system.

Method

This study is based on an individual case study over a two and a half year period during which the child was video-recorded in school most of the time and occasionally at home. The data were transcribed, formatted to CHAT (see MacWhinney 1995), and analysed using a linguistic analysis based on the Principles and Parameters Approach (Chomsky 1991).

Subject

The participant in this study, Dewi, is a boy who comes from a Welsh-speaking home and attends a Welsh medium state school. He is fully integrated in the mainstream education system with the support of a non-teaching assistant. Dewi became deaf after developing meningitis at 18 months. He received his implant two years later, aged 3;6. The first two non-teaching assistants who worked with Dewi used a combination of sign and speech with him and they had reached level 2 in BSL, but the third and current assistant does not sign. Although Dewi used signs when first recorded, there is little evidence in the recordings that he uses signs now. Dewi's speech is clear and his intonation is good, without the typical features of the speech of profoundly hearing-impaired children.

Data

The data were collected by video recording, and the length of the video

tapes ranges from 31 minutes to 1 hour, 8 minutes. The aim was to obtain recordings between 45 minutes to one hour long. The recording sessions are listed in Table 1 together with chronological age and number of years post-implant for each session.

Table 1: List of recording sessions

Recording	Date	Location	Chronological age	Years post implant
1	17/03/97	School	7;1	3;5
2	21/04/97	School	7;2	3;4
3	18/06/97	School	7;4	3;8
4	26/07/97	Home	7;5	3;9
5	22/11/97	Home	7;9	4;2
6	9/03/98	School	8;1	4;5
7	02/07/98	Home	8;5	4;10
8	26/08/98	Home	8;6	4;11
9	22/03/99	School	9;1	5;6
10	10/06/99	School	9;4	5;8
11	27/09/99	Home	9;7	6;0
Date of birth: 08/02/90. Date of implant: 21/09/93. Age at implant: 3;7				

The recordings were transcribed by a Speech and Language Therapist from the same area. CHILDES (Child Language Data Exchange System; see MacWhinney 1995) was used to create a database, and the transcripts were formatted using CHAT (Codes for the Human Analysis of Transcripts). The data were then analysed for the word mean length of utterances (MLU) and word sequences using the CLAN (Computerised Language Analysis) programmes to identify the structures which reflect the development of the three functional systems. The MLU results were calculated in number of words and not in number of morphemes, as the data were especially coded to identify bound morphemes.

The examples (21)-(23) illustrate the limitations of Dewi's constructions. His utterances in the first recording sessions consisted essentially of enumerations involving counting or naming:

(21) un dau tri pedwar pump chwech. [Recording 1]
one two three four five six

(22) dad a Les a Dewi a Johnathan. [Recording 3]
dad and Les and Dewi and Johnathan.

(23) car glas .. un gloi ... car glas ... un car melyn. gloi ... car melyn
car blue one fast car blue one car yellow fast car yellow

car glas ... gloi ... gloi slow ... gloi [Recording 5]
car blue fast fast slow fast

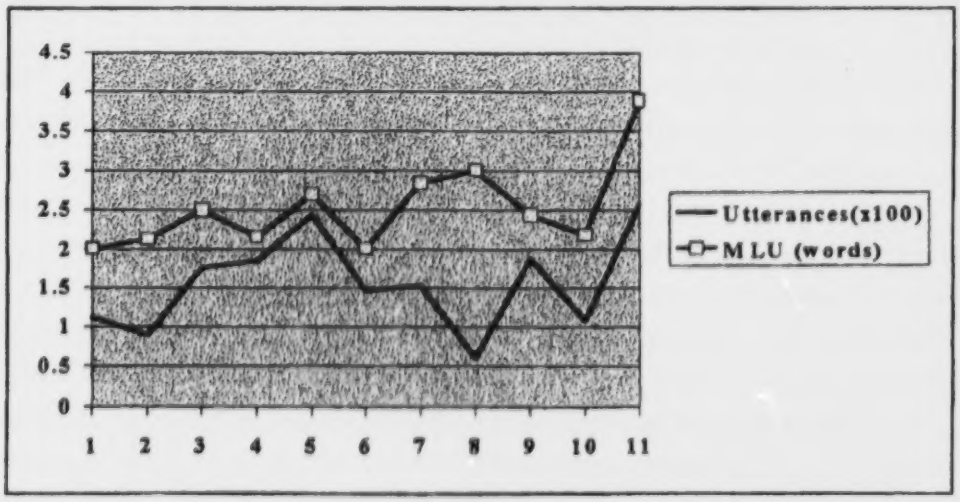
'blue car fast one blue car one yellow car fast yellow car blue car fast fast slow fast'.

However progress was evident during the year and the structure of noun phrases became more complex especially as modifiers and specifiers were used, albeit inconsistently:

(24) melyn ar ben y coch. [Recording 3]
yellow on top the red
'the yellow one on top of the red'.

The results given in Figure 1 indicate an increase in the length of utterances as well in the MLU, although the progression is not regular.

Figure 1: Utterances and MLU (in words) per session



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The determiner system

The D-system is clearly emerging in Dewi's grammar, and the most common DP is formed by combining the article and the noun. Personal pronouns, too, are widely used, whereas possessive pronouns with nouns are less used.

Table 2: The Determiner system

Session	Number of utterances	Art N	NN	N Pr	Pr N	Pr N Pr	Pronouns
1	41	0	3	0	0	0	6
2	43	3	0	0	0	0	1
3	45	11	1	0	0	0	8
4	48	1	0	0	0	0	12
5	50	2	0	0	0	0	29
6	53	3	3	0	0	1	13
7	58	37	1	2	0	0	12
8	59	8	0	2	3	0	22
9	66	8	0	0	0	0	9
10	72	6	1	1	0	0	6
11	77	6	6	5	0	0	113
Art = article. N = Noun.							

The following examples illustrate Dewi's use of determiners, including the articles, possessive pronouns, and possessive construction. His increasing competence in the use of personal pronouns is also reflected in the increase in the types of pronouns: from three in the first recording (*fe* [3rd singular masculine], *fi* [1st singular], and *ti* [2nd singular]) to six different types in the last recording, adding 3rd person *e* 'he' and *hi* 'she' as well as 1st person plural *ni* 'we'.

(25) Mae'r hwyaden yn y bocs glas. [Recording 7]
is the duck in the box blue.
'The duck is in the blue box'.

(26) Bet yw dy enw di? [Recording 6]
What is 2ndSg name 2ndSg
'What's your name?'

(27) Ie a fi ffrind a Jonathon. [Recording 8]
Yes and my friend and Jonathan
'Yes and my friend and Jonathan'.

(28) Ty tadcu Nerys. [Recording 9]
house grandad Nerys
'at Nerys's grandad's house'.

The I-system

Young Welsh-speaking children go through an infinitival verb stage (Borsley and Jones 2001) and finite verbs emerge later. It seems that at the time of the first recording Dewi was beginning to use finite verbs, but there is also a large number of non-finite verbs, and in that respect Dewi follows the early patterns of normally-hearing children presented by Borsley and Jones (2001).

Table 3: The inflectional system

Recording	Number of utterances	Aspect	Finite *bod*	Finite main Verb	Predicative *yn*
1	41	0	2	1	0
2	43	3	7	1	1
3	45	3	12	2	0
4	48	5	2	6	0
5	50	5	17	6	1
6	53	3	20	2	1
7	58	8	27	6	1
8	59	3	3	4	0
9	66	13	16	1	0
10	72	8	13	0	0
11	77	35	37	6	1

In the development of the I-system we observe the use of the aspect particles, the copula and auxiliary, the predicative particle *yn*, and the finite verb. The aspect particles *yn* and *wedi* are the first to emerge and they remain fairly high throughout the data.

The number of finite *bod* tokens increases, and in the last recording there were 37 instances of *bod* representing 11 different morphological realizations of that verb. In the last three recordings both the aspectual

particles and the finite *bod* are closely related, suggesting that sentences are becoming fully structured. The predicative particle *yn* is scarcely and infrequently used. It appears that the I-system is developing in Dewi's grammar as aspect and auxiliaries are being incorporated into his sentences.

The following examples illustrate Dewi's progress in clause structure from small clause structure to the fully grammatical sentence.

(29) fi dau. [Recording 1]
me two
'I have two'.

(30) mam a dad yn gerdded. [Recording 3]
mam and dad PROG walk
'Mam and dad walking'.

(31) fi 'di ennill. [Recording 4]
I PERF win
'I have won'.

(32) Mae mamgu yn mynd gartref fory. [Recording 7]
is grandma PROG go home tomorrow
'Grandma is going home tomorrow'.

Negatives

Although the negative *dim* is widely present in the data used as a negative quantifier, the number of negated clauses was rather low, as shown in Table 4. Only two full negative constructions occurred with either the negative adverb *dim* and the negative auxiliary. In the other instances *dim* negates a VP with a non-finite verb.

(33) dim wedi gorffen 'to. [Recording 9]
NEG PERF finish also
'I haven't finished either'.

(34) Dwi i ddim yn gwybod beth i neud. [Recording 10]
am I NEG PROG know what to do
'I don't know what to do'.

Table 4: Negative clauses

Recording	Utterances	Neg V	Neg S V	S Neg V	Neg Aux
1	41	1	0	0	0
2	43	0	0	0	0
3	45	0	0	0	0
4	48	2	0	0	0
5	50	0	0	0	3
6	53	0	0	0	0
7	58	0	0	0	0
8	59	2	0	1	0
9	66	0	1	0	0
10	72	0	0	1	4
11	77	1	0	0	2
Neg = negative marker. V = verb. S = subject. Aux = Auxiliary.					

The development of Dewi's I-system can be described as evolving gradually and having reached a stage where *bod* and the aspectual markers are combined, suggesting that the structures of the I-system are present. The predicative particle *yn* is less frequent, and so are fully-constructed negatives.

The Complementizer system

Clear evidence for the emergence of a complementizer system is found in the use of subordinate conjunctions and the interrogative pronouns. Dewi's utterances are all single clause structures, with a few exceptions in all of the recordings. Although Dewi used interrogative words as clarification devices in conversation, there were no interrogative constructions before the 5th recording. Focused constructions were present from the 4th recording. The number of sentences with a complementizer system increased in the last recording. Examples are found in (35)-(37) below, and results summarized in Table 5.

(35) Beth yw hwnna. [Recording 5]
what is that one
'What is that one?'

(36) Ble mae'r pêl?
where is the ball
'Where's the ball?'

(37) Faint sydd da ti?
how many is to you
'How many do you have?'

Table 5: Interrogative and focus clauses

Recording	Number of utterances	WH Aux	Topic Aux
1	41	0	0
2	43	0	1
3	45	0	0
4	48	0	2
5	50	5	1
6	53	1	1
7	58	10	1
8	59	2	0
9	66	2	2
10	72	1	1
11	77	10	14
WH = interrogative particle. Aux = auxiliary.			

The C-system can be considered to be fully acquired if interrogatives, focus constructions, and subordinate clauses are present. In the case of Dewi only interrogatives and focus structures have been used, but there is little evidence of subordination, with the exception of the example in recording 11, a clause headed by ***beth*** 'what'.

(34) Dwi ddim yn gwybod beth i neud. [Recording 11]
am NEG PROG know what to do
'I don't know what to do'.

As with other functors, the increase in number reflects an increase in type, and in the last recording there were five different interrogative pronouns: ***beth*** 'what', ***ble*** 'where', ***faint*** 'how many', ***pam*** 'why', and ***pwy*** 'who'.

The other important construction missing in Dewi's grammar is the restrictive relative clause, which can emerge late in the grammar of hearing impaired children. It is clear thus that he has not yet developed a full C-system, and in that respect he conforms to the findings of De Villiers, De Villiers, and Hoban (1994).

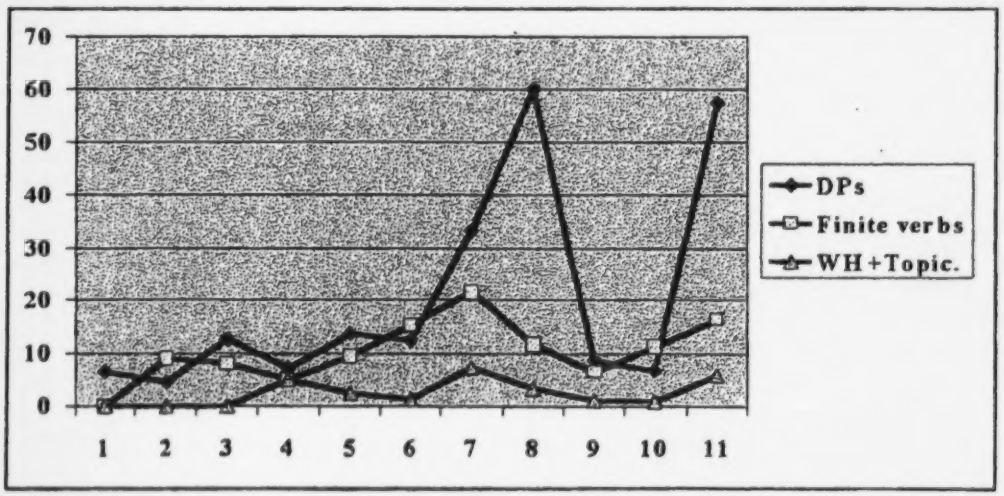
The next step towards the full development of the C-system will be the

acquisition of complex clauses. Children with normal hearing can use a variety of subordinate clauses. A brief survey of narratives by 9-10 year olds Welsh speaking school children has revealed that they are using a variety of subordinate clauses, including the *bod* infinitive.

Summary

Dewi's grammar has improved markedly in the three year period during which he has been recorded. His language development has progressed through the functional systems, and Figure 2 shows this achievement. It also shows that the D-system is the most advanced of the three, followed by the I-system — last to develop is the C-system. In that respect Dewi is no different to children acquiring language under normal circumstances (Radford 1996). The main difference for Dewi is in the length of time taken to reach this level. Under normal circumstances children's main grammatical categories develop in a short period, and Radford (1990) has claimed that in English the functional systems are acquired between 24 and 27 months. Six years after receiving the cochlear implant Dewi has not yet fully acquired the complementizer system, and subordinate clauses are still missing.

Figure 2: Summary of functional systems



However it is difficult to fully appreciate the extent of the delay in Dewi's case, as little is known about the later stages in the acquisition of Welsh. It is not therefore possible to predict if Dewi will reach the same

level of linguistic competence as normally hearing children. The fact is that he experienced a period of total deafness during the critical period for language development. The fact he had normal hearing until the age of 18 months can explain that his clear pronunciation and intonation, however the effect has been more serious on the development of language.

The data obtained form Dewi's recordings were not coded for errors, and it is therefore impossible to assess the strength of his grammar. Sentence fragments which are appropriate in conversation have not been separated from ungrammatical sequences. Nonetheless there is progression, and he can still progress towards achieving the best possible language development.

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THE ACQUISITION OF GRAMMATICAL GENDER IN WELSH

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Two experiments examine the development of grammatical gender in Welsh-speaking children. Experiment 1 explores children's productive abilities with local cues to gender, Experiment 2 children's interpretative abilities with long-distance agreement for gender. Participants in Experiment 1 were children between 4;0 and 9;7 and in Experiment 2 between 4;8 and 11;1. All were from North Wales. In Experiment 1, subjects came from Welsh-only homes; in Experiment 2, they came from Welsh-only, English-only, or Welsh-English homes. Results suggest that when a language has a complex gender system that is marked by opaque morphophonological processes, the course of development is protracted and variable. Children acquire Welsh gender in relation to noun marking, adjective marking, and long-distance agreement in a piecemeal fashion. Use for human referents appears most productive, but extension of the system beyond use for human referents seems to occur to some degree.

Introduction[1]

One of the characteristic features of Celtic languages is the pervasive presence of mutations, morphophonological changes that affect the initial consonants of words, but which are triggered primarily by morphosyntactic conditioning. In Welsh, three are three major mutation types, Soft Mutation, Nasal Mutation, and Aspirate Mutation, each of which occurs in a variety of lexical and syntactic contexts.The primary goal of this study is

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to examine children's productive and receptive command of soft Mutation in relation to one of these contexts, grammatical gender. The study will also, secondarily, provide information on the acquisition of Aspirate Mutation in relation to gender.

Research on the acquisition of grammatical gender across languages has shown that for many languages, children gain an early command of gender. Children have been shown in a number of languages to construct or learn the systems largely on the basis of distributional privileges (Popova 1973; Karmiloff-Smith 1978, 1979; Levy 1983a, 1983b, 1996; Berman 1985; Smoczyńska 1985; Mills 1986; Cain, Weber-Olsen, and Smith 1987) and to do so swiftly and effortlessly (e.g. Smoczyńska 1985). Often in the languages studied, however, gender marking is quite overt and provides a clear one-to-one correspondence between a marker and the gender encoded. When the system is somewhat more opaque, the acquisition of gender appears more difficult and more protracted (e.g. Maratsos and Chalkley 1980; Mulford 1985; Smoczyńska 1985), as is often the case with opaque systems (Lieven 1997). In fact, in such cases, children may make use of semantic information to help them break into the system (Mulford 1985).

Gender marking in Welsh is primarily encoded as part of a complex system involving Soft Mutation (henceforth 'SM'), a process of lenition applying to stops, /m/, and liquids. There are multiple form-function mappings between SM and what it encodes, which makes the grammatical gender system quite opaque. Because the system is complex, it allows us to address a number of theoretical questions regarding the acquisition of gender and regarding the acquisition of language in general:

(1) How do children go about acquiring a complex/opaque grammatical gender system in their language?

(2) To what extent do children rely on a variety of clues to categorization in acquiring gender constructs?

(3) To what extent do children construct abstract representations of the grammatical system they are learning, or, conversely, to what extent does their knowledge remain more piecemeal and closer to the surface?

(4) How does children's performance on local marking of gender compare with their distant marking of gender?

(5) To what extent does the amount of exposure to the Welsh language affect the answers to these questions?

The two experiments reported here attempt to provide some answers to these questions.

Mutation and the grammatical gender system

Under SM, word-initial voiceless stops and liquids (i.e. /p, t, k, ɬ, ɾ/) become voiced (/b, d, g, l, r/), /m/ and the voiced stops /b, d/ become fricatives (/v, v, ð/), and /g/ gets deleted. The conditioning environments for the occurrence of SM are numerous. Table 1 below presents some samples of environments that trigger SM; these include occurrence immediately after certain prepositions, after certain possessive forms, after certain conjunctions, after demonstrative verbs, after certain numerals, after the predicative particle *yn*, and after Subjects (or, alternatively, on Objects or under c-command — see Harlow 1989; Borsley and Tallerman, in press).

In addition to the contexts listed in Table 1, SM plays a key role in the marking of grammatical gender, as follows:

(1) Feminine singular nouns undergo SM after the definite article, *y(r)* and the numeral *un* 'one', e.g. *y gath* /əgaθ/ (<*cath* /kaθ/) 'the cat'; *un gath* /ɨngaθ/ (<*cath*) 'one cat'.

(2) Adjectives undergo SM after feminine singular nouns, e.g. *cath fawr* /kaθ vaur/ (<*mawr*) 'big cat'.

Note that SM occurs only when the feminine noun is singular. If a feminine noun occurs in the plural, neither it nor its modifying adjective undergoes soft mutation. This marking of feminine nouns in the singular contrasts with masculine nouns and adjectives following masculine nouns, which do not undergo Soft Mutation, e.g. *y ci* 'the dog'; *ci mawr* 'big dog'.

This use of SM to identify feminine nouns in 'local' contexts (i.e. on the noun and its immediate modifiers) contrasts sharply with the use of SM in 'distant' contexts for gender, with the possessive adjective *ei* (3rd person singular). Here SM signals a *masculine* antecedent, e.g. *ei gath* (/gaθ/) 'his cat', *ei gi* (/gi/) (<*ci* /ki/) 'his dog'. If the antecedent is a *feminine* noun, the modified noun undergoes Aspirate Mutation, whereby /p, t, k/ become /f, θ, x/ (*ei chath* (/xaθ/) (< /kaθ/) 'her cat', *ei chi* (/xi/) (</ki/) 'her dog'.

Table 1: Sample of environments that trigger Soft Mutation

Trigger	Examples
certain prepositions **ar** ___ 'on' **i** ___ 'to'	Mae Mair *ar gadair* (< cadair, F) 'Mary is on (a) chair' 'Dw i'n mynd *i lwyddo* (< llwyddo) 'I'm going to succeed'
certain possessives **dy** ___ 'your'	Lle mae *dy bêl*? (< pêl, F) 'Where's your ball?' Saf ar *dy draed* (< troed, F, M) 'Stand on your feet'
certain conjunctions **neu** ___ 'or' **pan** ___ 'when'	tatws *neu foron*? (<moron, F) 'Potatoes or carrots?' *Pan ddigwyddith* (< digwyddith) 'When it happens ...'
demonstrative verbs **Dyna** ___ 'there is' **Dyma** ___ 'here is'	*Dyna wely* (< gwely, M) 'There's (a) bed' *Dyma raw* (< rhaw, F) 'Here's (a) shovel'
certain numerals **dau** ___ 'two' (M) **dwy** ___ 'two' (F)	*dau flodyn* (< blodyn, M) 'two flower(s)' *dwy fasged* (<basged, F) 'two basket(s)'
predicative particle **yn** ___ 'two' (M)	Roedd y caffe *'n wag* (<gwag) 'the cafe was empty'
Subject ____ (or, on the Object)	Mi welodd cath *gi* (<ci, M) 'A cat saw a dog' Pwy welodd *mam*? 'Who did Mom see?' Pwy welodd *fam*? (< mam, F) 'Who saw a Mom?'

The resulting system is thus quite opaque, for the following reasons: (1) There is no one-to-one correspondence between form and function (e.g., we can't say that SM means 'feminine gender', or even 'some type of gender'). (2) There are gaps in the system (e.g., plural feminine nouns do not undergo or trigger SM). (3) There are contradictory triggers (both feminine and masculine gender can trigger SM). (4) There is a great deal of variability in adherence to the mutations in adult speech (Thomas 1984, Ball 1988b, Watkins 1993). There is variability *across* the three types of mutation (Ball 1988a, 1988c; Watkins 1993); ***within*** mutation types; by lexical item (Thomas 1984, Ball 1988c: 77-78, Hatton 1988, Thomas 2001); and in phonology, whereby phonemes susceptible to a given type of mutation are not equally affected in every context (Watkins 1993, Thorne 1993). (5) Finally, there are cases in which there is no overt marker of gender — namely, words beginning with non-mutatable sounds. Words like ***ffenestr*** 'window' (feminine) will have no overt marking of gender, since /f/ (like the other non-mutatable word-initial consonants, /θ, s, ʃ, h, v, n, l/; see Awbery 1984) does not undergo mutation.

Research that has been conducted on the acquisition of mutations in Welsh and other Celtic languages provides some insight into their development. First, there is considerable evidence that the acquisition of the mutation system is quite protracted and is not completed until well after age 5, perhaps even after age 11 (Bellin 1984, Hatton 1988, Jones 1992). Some have argued, in fact, that the mutation system in relation to gender is dying (Jones 1998). Second, initial steps to acquisition may be quite piecemeal. For example, Ó Baoill (1992) and Stephens (1996) have suggested that children may begin initially with a single form per noun. Third, children perform distinctly on formal versus naturalistic tasks, perhaps better on the former (Bellin 1988), perhaps worse (Thomas 2001). Fourth, the amount and type of linguistic input affects acquisition. Children who hear Welsh at home perform differently from children who hear English at home. The difference in performance is not necessarily one way, however (Hatton 1988, Jones 1992). Finally, bilingualism may affect acquisition. Two studies mention that the words that were least often mutated by their bilingual subjects were cognates in the two languages the children knew (Bellin 1988 for Welsh-English, Stephens 1996 for Breton-French). The following experiments were conducted to provide further information on these issues.

Experiment 1: gender production

The purpose of Experiment 1was to elicit children's productive command

of gender marking in a controlled experiment in which particular gendered constructs were elicited.[2] The goal was to determine the following:

(1) To what extent, and at what phase in development, do Welsh-speaking children rely on specific cues for gender categorization that are available in the input?

(2) Is one type of contextual information more useful as a cue than another?

(3) To what extent is children's knowledge of gender productive?

Method

Six tasks were designed to elicit the production of nouns and adjectives in gender-relevant contexts. Specifically, the tasks were designed to test knowledge of the marking of gender on the noun after the definite article and on the adjective following a noun.

Non- linguistic stimuli

Pictures were drawn to accompany the linguistic stimuli. For each noun tested, one or two pictures were shown to children. In some cases, one picture was shown to accompany both the stimulus given by the experimenter and the structure elicited from the child; in other cases, two pictures were used, one to accompany the stimulus given by the experimenter and the other to accompany the structure elicited from the child. The pictures for the given task were either presented together as a 'story' or shown as a series of 'cards' that the child could then 'post' in a box after responding.

Linguistic stimuli

Six tasks were designed, each of which provided the child with one linguistic structure with a given noun and asked the child to produce another structure with the same noun. Half the nouns included in the tasks were real nouns, and half were nonsense nouns, as follows. One hundred forty-four real words were selected for use across the six tasks. These included 6 masculine and 6 feminine nouns beginning with each of the consonants /p,

2. Experiment 1 was part of a larger study (Thomas 2001) on the acquisition of gender by Welsh-dominant children in the Gwynedd county area.

t, k, b, d, g, ɬ, ɾ, m, n, f/, as well as 6 masculine and 6 feminine nouns that began with vowels. In addition, 144 nonsense nouns were constructed so that for each of the above consonant phonemes there were 12 nonsense words beginning with that sound; 12 nonsense words beginning with vowels were also created. This gave a grand total of 288 nouns. It should be noted that all of these nouns referred to inanimate objects.

Within a given task, each child heard 48 of these nouns (one masculine real for each of the word-initial phonemes, one feminine real for each of the phonemes, and two nonsense nouns for each of the phonemes), with the 288 words distributed across the six tasks for a given child. So that the distribution of the nouns across the six tasks was balanced, six versions of the entire test were drawn up. Version A had nouns 1-48 used in task 1, nouns 49-96 in task 2, nouns 97-144 in task 3, nouns 145-192 in task 4, nouns 193-240 in task 5, and nouns 241-288 in task 6; version B had nouns 49-96 in task 1, nouns 97-144 in task 2, and so forth; version C had nouns 97-144 in task 1, nouns 145-192 in task 2; and so on. Two children in each age group heard a given version of the test. Thus, each noun was heard in each task by two children in each age group, and each noun was used in every task an equivalent number of times across children.

The structures given by the experimenter and elicited back from the child for each of the six tasks are shown in Table 2 below. These were designed so that the structure provided by the experimenter contained no cue to the gender of the noun (tasks 1 and 2), one cue to the gender of the noun (presence or absence of SM on the noun after the definite article or on the adjective after a noun in tasks 3, 4, and 5), or two cues to the gender of the noun (presence or absence of SM on both the noun and a modifying adjective in task 6). Sample stimuli for each task are shown in Table 3.

Procedure

Each child was seen individually. For each task, the child was asked if he or she would like to play a game. The experimenter gave the child a sentence with one construction, and the child was asked to produce the target construction. For Task 1, for example, the child was asked if he or she would like to help tell a story about Mair, who had lost some things but then found them. The experimenter showed the child the first picture accompanied by the words *Roedd Mair wedi colli X* 'Mair had lost an X'. The child's task was to then produce *Ond nath Mair weld y X* 'but Mair saw the X'. Several practice items were used to ensure that the child understood what type of response s/he was expected to give.

Table 2: Production of Gender, Elicitation Tasks (Experiment 1)

Task	Child was given	Form elicited
Task 1: N → *y* N	noun	*y* + noun
Task 2: N → NA	noun	noun + adjective
Task 3: *y* N → NA	*y* + noun	noun + adjective
Task 4: NA → *y* N	noun + adjective	*y* + noun
Task 5: *y* N → N	*y* + noun	noun (without article)
Task 6: *y* N A → N	*y* + noun + adjective	noun (without article)
y = definite article; N = noun; A = adjective		

Table 3: Sample stimuli (Experiment 1)

Task	Experimenter	Child
Task 1	Roedd Mair wedi colli pêl 'Mair had lost a ball'.	Ond nath Mair weld y bêl 'but Mair saw the ball'
Task 2	Roedd Mair wedi cael pêl 'Mair had got a ball'	Roedd Mair efo pêl goch rwan 'Mair had a red ball now'
Task 3	Ar y cerdyn yma fedri di weld y bêl 'on this card you can see the ball'	Ac ar y cerdyn yma fedrwch chi weld y bêl goch 'and on this card you can see the red ball'
Task 4	Roedd Mair wedi colli pêl goch 'Mair had lost a red ball'	Ond nath hi weld y bêl ddu ar ei gwely 'but she saw the black ball on her bed'
Task 5	Yn y llun yma fedri di weld y bêl 'in this picture you can see the ball'	Dyma lun pêl 'this is a picture of a ball'
Task 6	Yn y llun yma fedri di weld y bêl goch 'in this picture you can see the red ball'	Dyma lun pêl. 'here's a picture of a ball'

Predictions

The predictions of this experiment were the following:

(1) If children are using cues to gender status to inform themselves

about the gender of a noun, they should perform better on tasks 3-6 (with cues) than on tasks 1 and 2 (without cues).

(2) If children are using cues to gender status, they should perform better on tasks with multiple cues than on tasks with only one cue, i.e. better on task 6 (two cues) than on task 5 (one cue).

(3) If gender is a property of nouns, then children should perform better at an early age on tasks eliciting noun forms than on tasks eliciting adjective forms, i.e. better on tasks 1, 4, 5, 6 (nouns) than on tasks 2 and 3 (adjectives).

(4) Children should perform better on items involving real nouns than on those involving nonsense nouns.

(5) However, if children are gradually developing an abstract, rule-based system, as they get older, performance on nonsense nouns should improve.

Participants

Forty-eight children took part in this study. The children attended primary schools either on Anglesey or in the Bangor and Ogwen area. All of them spoke Welsh as their first language and lived in homes where 80% to 100% of the input was in Welsh. (In fact, in all but two cases, parents reported 100% use of Welsh in the home.) The children were divided into four age groups, with 12 children in each group: Group 1 ('4 1/2 year-olds') were between 4;0 and 5;5, mean age = 4;9; Group 2 ('6-year-olds') were between 5;7 and 6;7, mean age = 6;2; Group 3 ('7 1/2-year-olds') were from 6;9 to 7;9, mean age = 7;2; and Group 4 ('9-year-olds') were between 8;3 and 9;7, mean age = 8;9. Twenty-seven children were female, 21 male.

Results

Each child was given a score in each cell for the proportion of times (out of that child's number of attempts) that he or she produced the appropriate form of noun or adjective. Since the data were in proportions, arcsin transformations were applied, and a repeated measures ANOVA was conducted on those scores. Task (tasks 1, 2, 3, 4, 5, and 6), gender (masculine, feminine), noun type (real, nonsense), and age (4 1/2-year-olds, 6-year-

olds, 7 1/2-year-olds, and 9-year-olds) were treated as independent variables.

The analysis revealed significant main effects, first, of gender (F (1, 33) = 874.41, p<.001) and noun type (F (1, 33) = 22.87, p < .001). Performance was generally good on masculine forms (M = .945, SD = .143) and poor on feminine forms (M = .202, SD = .262); performance was better on real nouns (M = .620, SD = .402) than on nonsense nouns (M = .527, SD = .448).

There was also a significant main effect of task (F (5, 165) = 9.27, p < .001). Performance by task is shown in Figure 1 below. Planned mean comparisons revealed significantly better performance on tasks 5 and 6, on the one hand, than on tasks 1, 2, and 3 on the other; on task 4 than on task 2; and on task 6 than on task 4 (all Fs (1,165) ≥ 7.8, all p < .01). These results indicate that children were better overall at giving the basic form of nouns when given gender-marked contexts (tasks 5 and 6) than they were at producing the appropriate form of nouns after the definite article when not given a cue (task 1). They were also better at giving the basic form of nouns given gender-marked contexts (tasks 5 and 6) than they were at producing the appropriate form of adjectives (tasks 2 and 3). The children were also better at producing the appropriate form of nouns after the definite article in task 4 than they were at producing the appropriate form of adjectives in task 2. Finally, the children were also better at giving the basic form of nouns from gender-marked contexts (task 6) than they were at producing the appropriate form of nouns after the definite article, even when a cue was given (task 4).

These main effects were modified by several significant interactions: task x gender (F (5, 165) = 9.71, p < .001); noun type x gender (F(1, 33) = 15.51, p < .001); task x noun type (F (5, 165) = 2.50, p < .05); gender x age (F (3, 33) = 3.75, p < .05); task x gender x age (F (15, 165) = 2.53, p < .01); and task x noun type x gender (F (5, 165) = 4.32, p < .01).

Performance by task and gender is shown in Figure 2. Follow-up analyses revealed that with masculine forms children performed better on tasks 4, 5, and 6 than on tasks 2 and 3, and with feminine forms, better on tasks 2 and 3 than on task 1, and on task 3 better than on task 4 (all Fs (1,165) > 5.6, all p < .05). That is, with masculine forms, children were better at giving the basic forms of nouns, either with or without the article (tasks 4, 5, and 6) than they were at producing the appropriate (basic) forms of adjectives (tasks 2 and 3). With feminine forms, in contrast, children were better at producing the mutated forms of adjectives after nouns (tasks 2 and 3) than they were at producing the mutated forms of nouns after the definite article given no cue (task 1). They were also better at producing

the SM form of adjectives after feminine nouns given a cue (task 3) than they were at producing the SM form of feminine nouns after the article also when given a cue (task 4).

Figure 1: Performance by task, Experiment 1

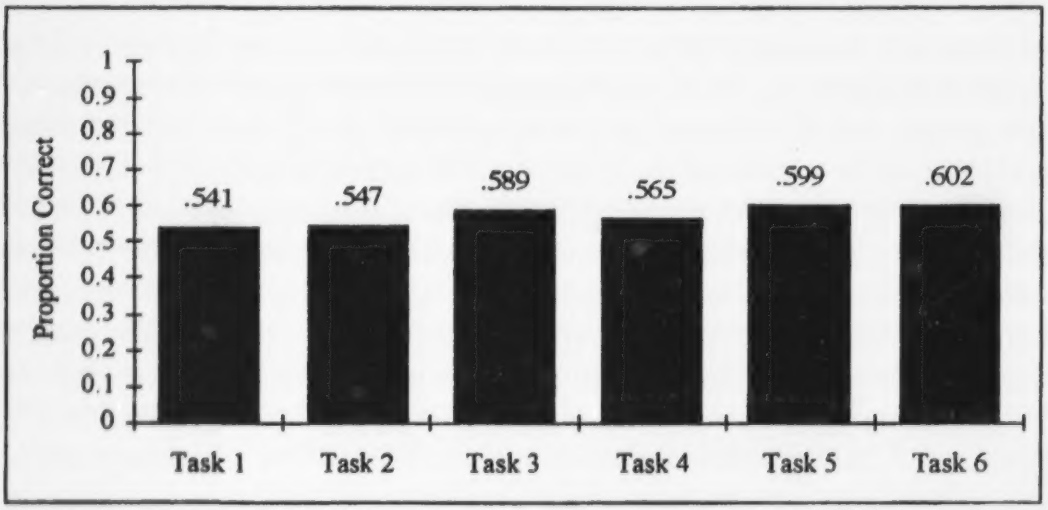
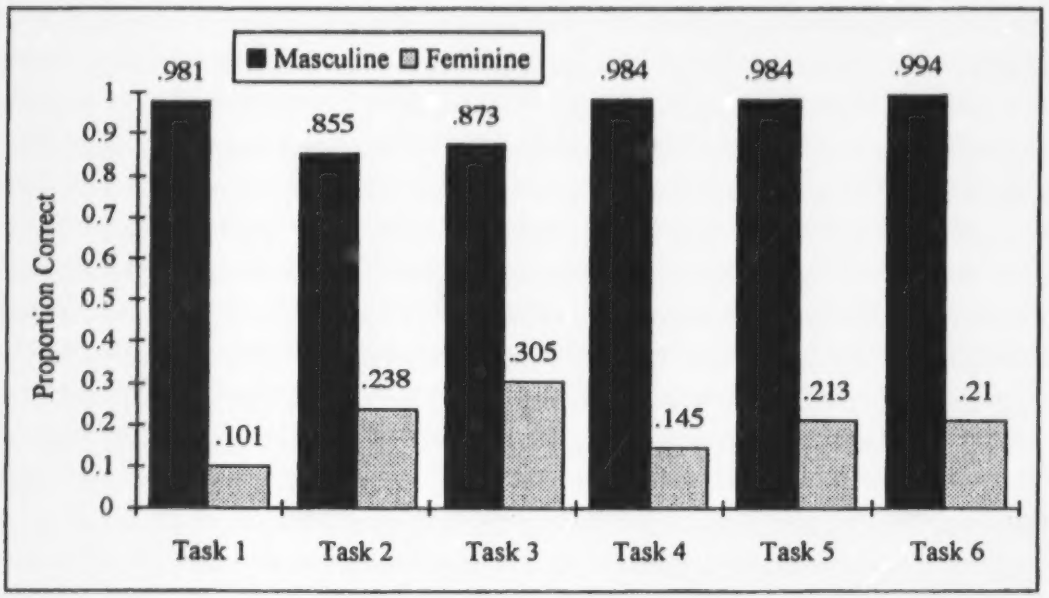


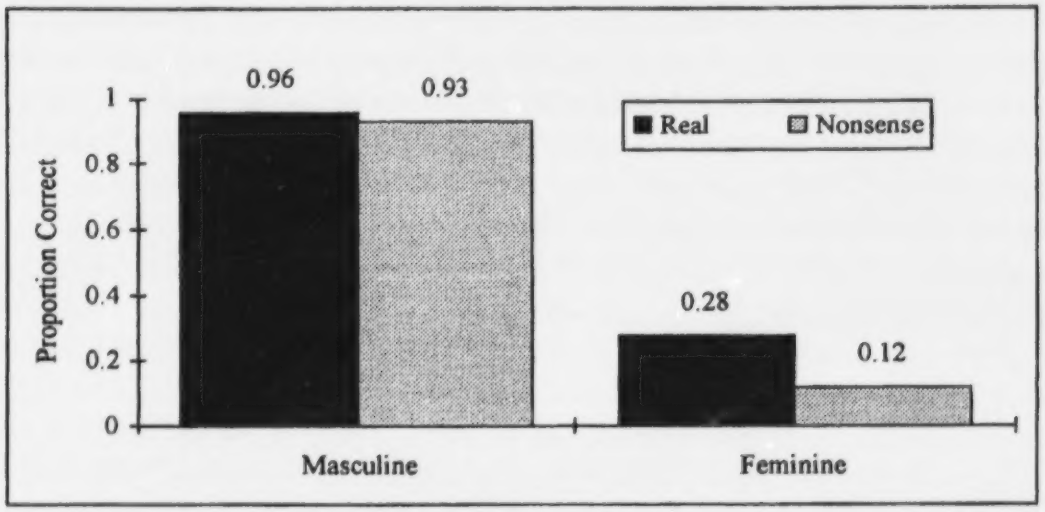
Figure 2: Performance by task x gender, Experiment 1



The interaction of noun type x gender, shown in Figure 3, indicated that

the better performance on real than on nonsense nouns occurred only with feminine forms (F (1,33) = 56.9, p. < .001).

Figure 3: Performance by noun type x gender, Experiment 1



The interaction of task x noun type is shown in Figure 4 below. Follow-up analyses revealed that for real nouns, children performed better on tasks 5 and 6 than on tasks 1, 2, 3, and 4, and for nonsense nouns, they performed better on tasks 5 and 6 than on task 2, and better on task 3 than on tasks 4 and 6 (all Fs (1, 165) > 6.0, all p < .05). That is, for real nouns, children performed best when giving the basic forms of nouns (tasks 5 and 6), and were better at this than they were either at producing the appropriate forms of nouns after the definite article (tasks 1 and 4) or at giving the appropriate forms of adjectives (tasks 2 and 3). For nonsense forms, they were better at giving the basic forms of nouns (tasks 5 and 6) than they were at producing the appropriate forms of adjectives, given no cue (task 2), and they were better at producing adjectives, given a cue to gender (task 3), than at producing noun forms, either after the definite article given a cue (task 4) or in basic form after gender-marked cues (task 6).

Performance by gender and age is shown in Figure 5. Follow-up analyses revealed that there were no significant differences across ages for performance on feminine forms, but for masculine forms, 7 1/2-year-olds performed better than 9-year-olds (Student-Newman-Keuls analysis, p < .05). The three-way interaction of task x gender x age, shown in Figures 6 and 7, further revealed that with masculine forms (Figure 6), 6- and 9-year-olds performed better on tasks 1, 4, 5, and 6 than on task 2, and 9-year-olds also did better on tasks 1, 4, 5, and 6 than on task 3 (all Fs (1, 165) >

6.4, all $p < .05$). Thus, on masculine forms, 6- and 9-year-olds were better at producing (the basic forms of) nouns than at producing (the basic forms of) adjectives (task 2). For 9-year-olds, this was the case even when a gender cue was present (task 3). On feminine forms, 9-year-olds performed better on the production of (mutated forms of) adjectives when given a cue (task 3) than on the production of the noun form (tasks 1, 4, 5, and 6).

Figure 4: performance by task x noun type, Experiment 1

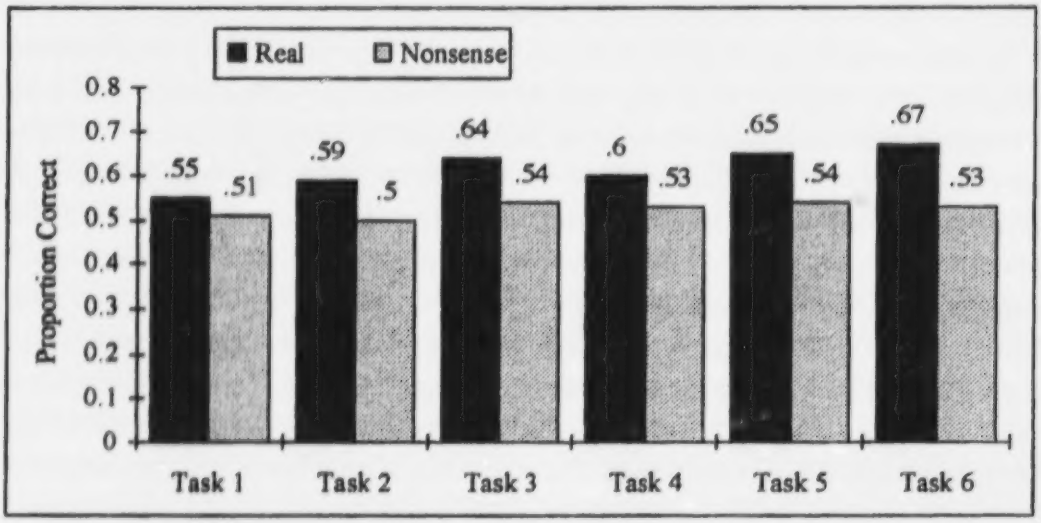
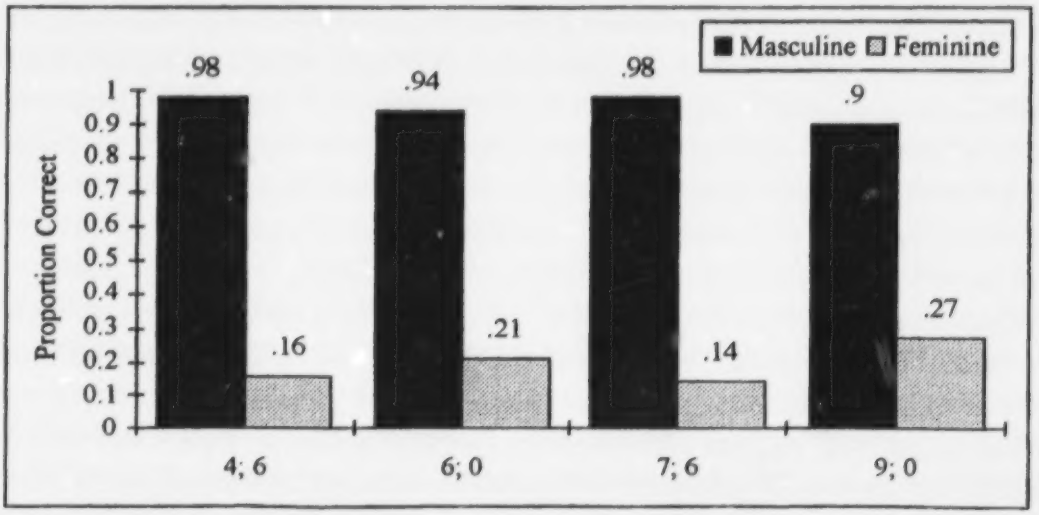


Figure 5: performance by gender x age, Experiment 1



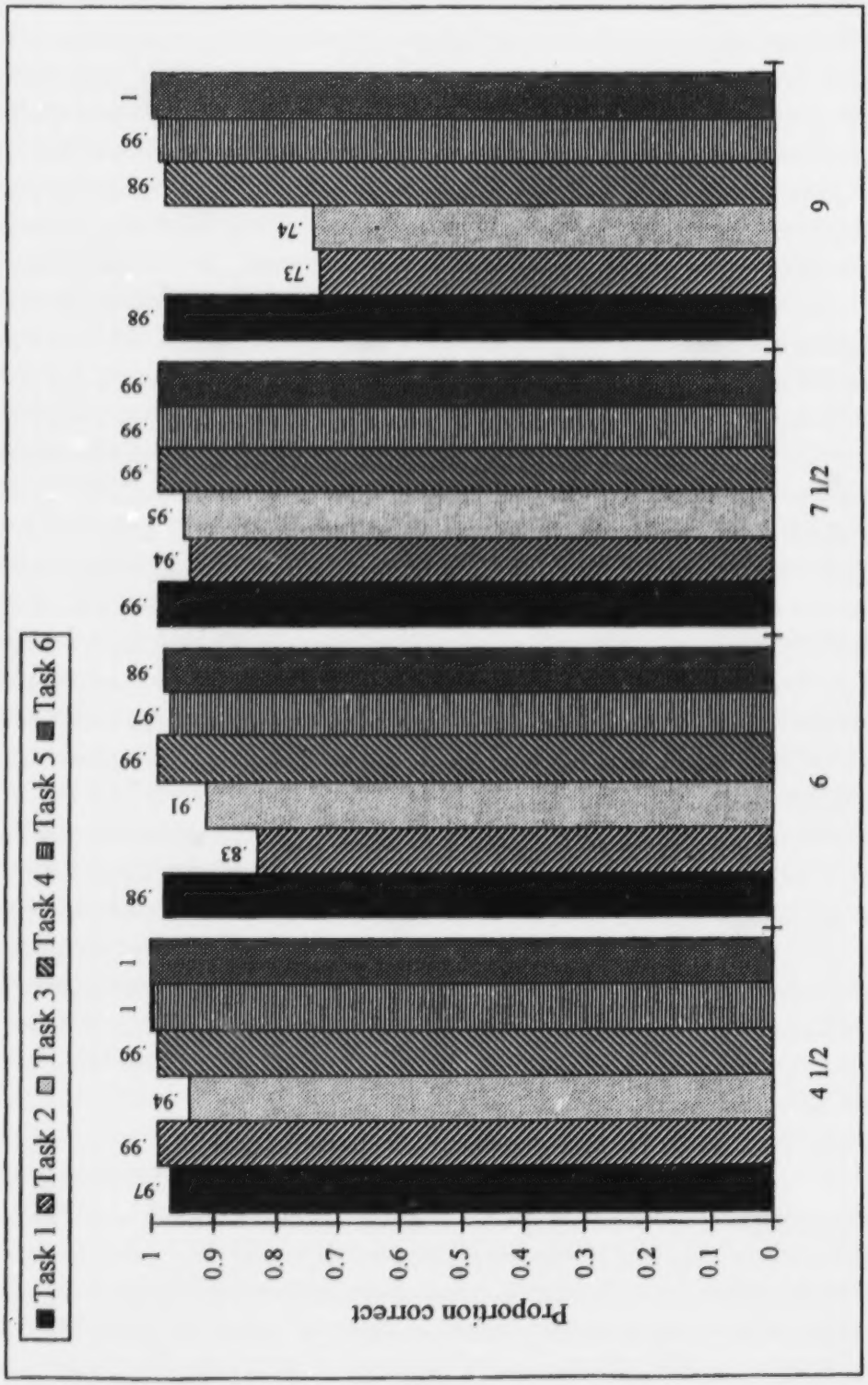
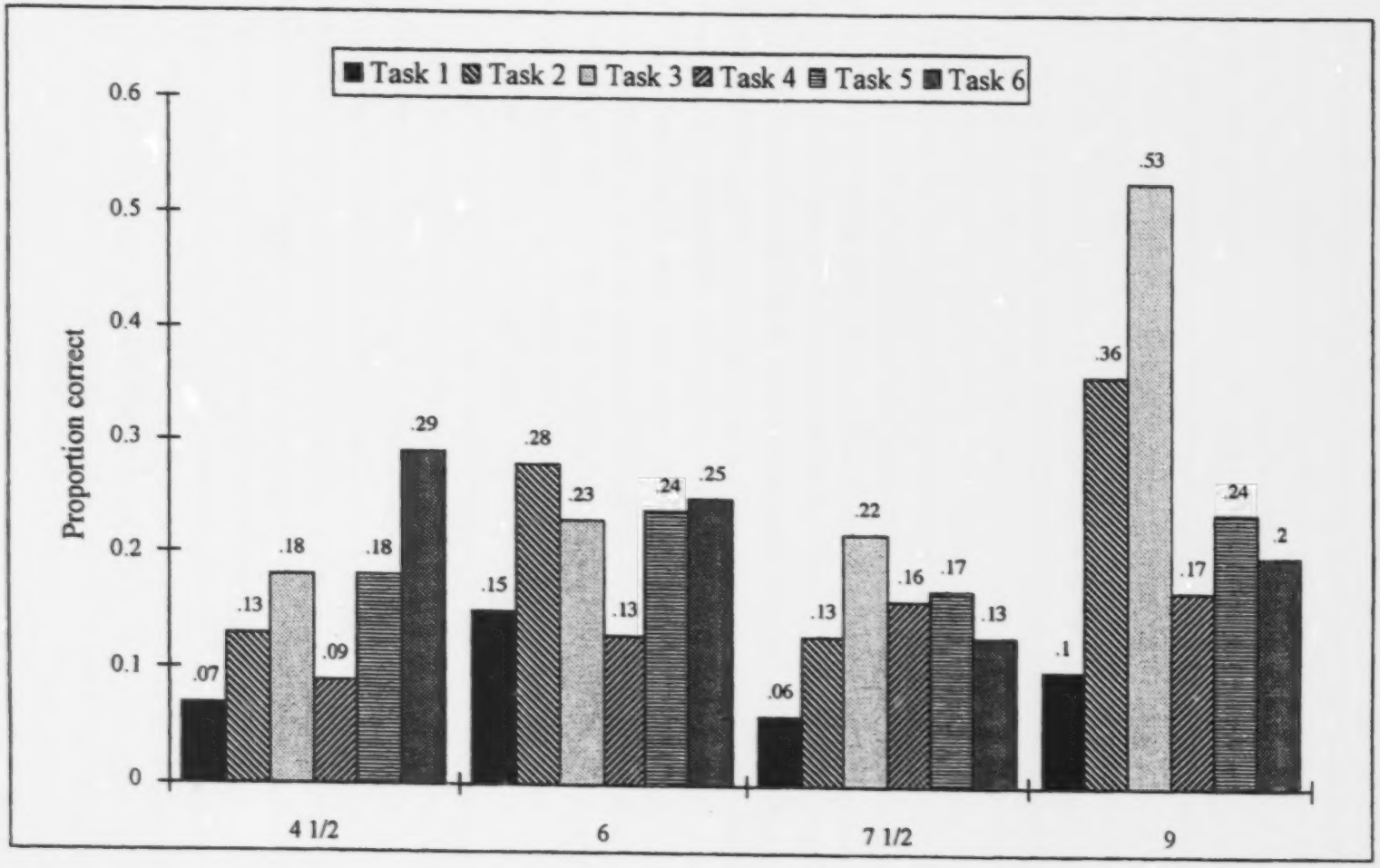


Figure 6: Performance by task x age x gender, Experiment 1 (masculine forms)

Figure 7: Performance by task x age x gender, Experiment 1 (feminine forms)



Finally, the interaction of task x noun type x gender is shown in Figure 8. Follow-up analyses revealed that, for real masculine nouns, performance was better on task 6 than on tasks 2 and 3, and on 1 than on 3 (Student-Newman-Keuls analysis, $p < .05$). Thus children generally performed better at giving the (basic) forms of nouns, with or without the article (tasks 6 and 1) than at producing the (basic) forms of adjectives (tasks 2 and 3). For real feminine nouns, children were better at giving the basic form of nouns after having cues (task 6) than they were at producing the SM form of feminine nouns after the article, after having no cue (task 1) (Student-Newman-Keuls analysis, $p < .05$).

For nonsense masculine forms, performance was better on tasks 1, 4, 5, and 6 than on tasks 2 and 3 (Student-Newman-Keuls, $p < .05$), i.e., the worst performance was at producing (basic forms of) adjectives after the nouns. For nonsense feminine forms, performance was better on task 3 than on tasks 1 and 4 (Student-Newman-Keuls, $p < .05$), that is, children were better at producing the (SM form of) adjectives when given a cue (task 3) than they were at producing the (SM form of) nouns after the definite article (tasks 1 and 4).

Summary and discussion: Experiment 1

Overall, the children performed better on masculine forms than on feminine forms. They were also better when real feminine nouns occurred than when nonsense feminine nouns were used. Across tasks, children were better at giving the basic forms of nouns without articles than they were at producing the appropriate form of nouns after the definite article or of adjectives after nouns.

Performance was different, however, with masculine versus feminine forms: with masculine forms, children were worse at providing appropriate (non-mutated) forms of adjectives than of noun forms. With feminine forms, in contrast, children performed better at giving appropriate (mutated) forms of adjectives than appropriate (mutated) forms of nouns after the definite article. Thus, children appeared to be overextending the use of mutated adjectives to masculine contexts, and to be underextending the use of SM for nouns in feminine contexts. These effects were most apparent among the 6- and 9-year-olds.

The results of this experiment shed light on the predictions made at the outset, as follows:

(1) *If children are using cues to gender status to inform themselves about the gender of a noun, they should perform better on tasks 3-6*

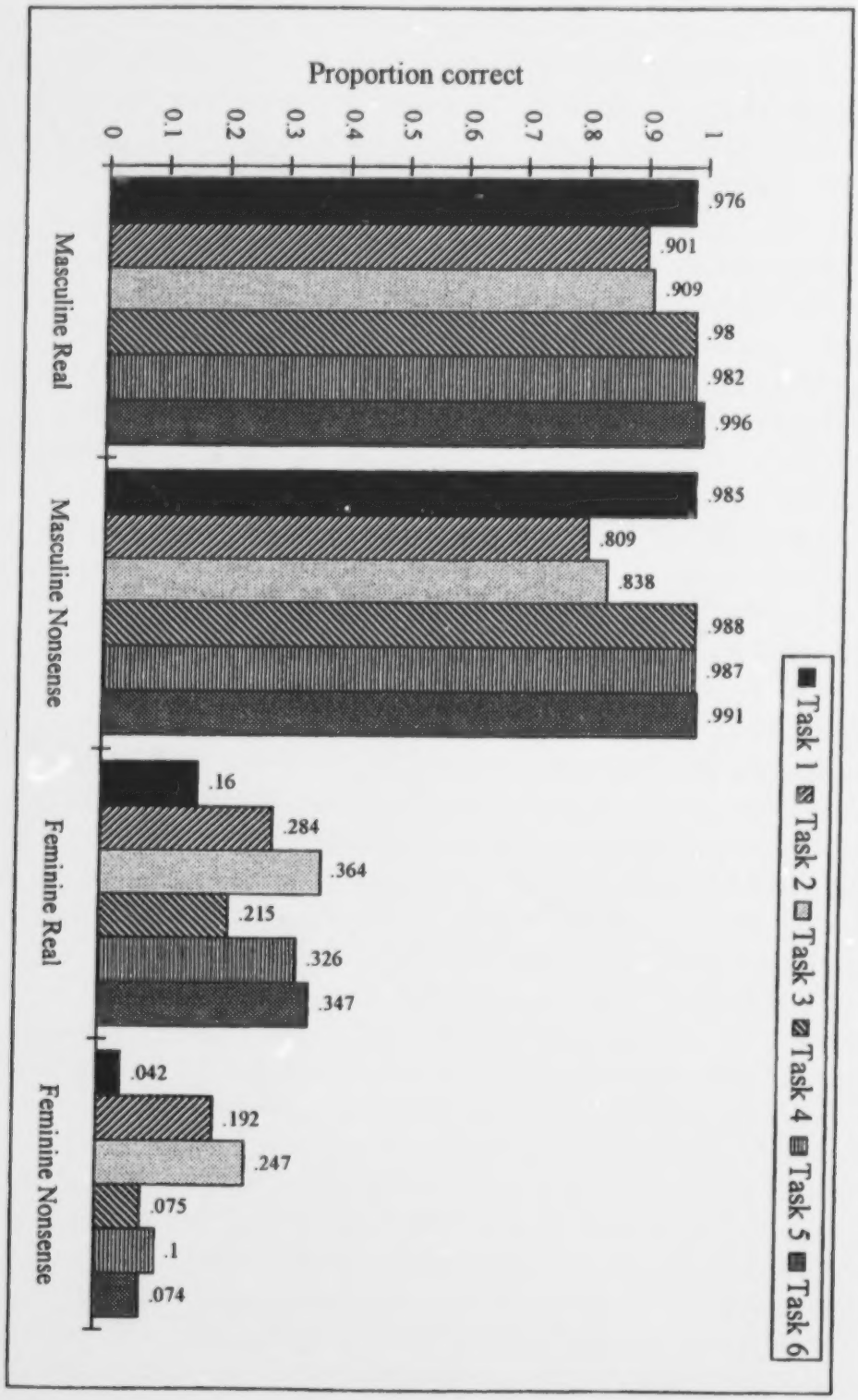


Figure 8: Performance by task x noun type x gender, Experiment 1

than on tasks 1 and 2. This prediction was not upheld by the data. While there were differences across tasks, they follow a more complex pattern, most often involving differential performance on nouns versus adjectives or on mutated versus non-mutated forms.

(2) *If children are using cues to gender status, they should perform better on tasks with multiple cues than on tasks with only one cue, i.e. better on task 6 than on task 5.* This prediction was similarly not upheld by the data.

(3) *If gender is a property of nouns, then children should perform better at an early age on tasks involving noun form than on tasks involving adjective form, i.e. better on tasks 1, 4, 5, and 6 than on tasks 2 and 3.* This prediction also did not in general hold. With masculine forms, performance was better on nouns than on adjectives, but with feminine forms, performance was better on adjectives than on nouns. This appears related to overuse of mutated forms of adjectives, even in masculine constructs, and underuse of mutated forms of nouns in feminine constructs with the definite article.

(4) *Children should perform better on items involving real nouns than on those involving nonsense nouns.* This prediction was upheld by the data.

(5) *However, if children are gradually developing an abstract, rule-based system, as they get older, performance on nonsense nouns should improve.* This prediction was not upheld by the data. Performance on nonsense nouns did not improve with age.

The results of this experiment suggest overall that perhaps children are not developing a system per se for gender: they do poorly on nonsense nouns, and a greater number of cues to gender status do not appear to boost performance. Instead, children's knowledge appears to be more piecemeal, with no strict abstract rules that govern the production of all forms. That more piecemeal knowledge may include the following: (a) For masculine nouns, children use a single (basic) form in these constructs. (b) Children seem to know that adjectives often occur in mutated forms in these constructs. This knowledge appears to grow with age, so that there is a dramatic increase at age 9 in the correct use of mutated adjectives with feminine nouns (task 3). This growing knowledge would also account for the overuse of mutated adjectives in masculine constructs, especially in

two of the older groups. (Such overuse is also in evidence among adults; cf. Thomas 2001.) (c) Children appear less knowledgeable that feminine nouns mutate after definite articles. Performance on feminines in this context did not improve with age. We shall return to these points in the final discussion section.

Experiment 2: gender comprehension

The purpose of Experiment 2 was to elicit children's interpretations of long-distance gender linkages between nouns and coreferential pronouns and possessive forms.[3] The questions addressed were the following:

(1) To what extent are children's interpretations of gendered pronouns (*hi*, feminine, and *o*, masculine) and of the third person singular possessives (*ei*) dependent on the grammatical gender of an antecedent, and is there a change with age?

(2) Is there a difference in children's reliance on grammatical gender in relation to pronominal forms (which do not involve mutations) vs. the possessive form (which does)?

(3) Is there a difference in children's abilities with the two types of forms in relation to human, animal, and inanimate antecedents?

(4) Finally, is there a difference in children's abilities according to the language used in the home, whether Welsh only is spoken, both Welsh and English are spoken, or English only is spoken?

The answers to these questions will help to illuminate, first, the degree to which children gain a productive command of these forms. Secondly, the data will provide information on the relative status of pronouns and possessives as involving natural gender versus grammatical gender. If children interpret these forms as referring to natural gender, i.e., as corresponding to the real-world sex of referents, they should perform better on human antecedents than inanimate antecedents (with animal antecedents somewhere between these). In contrast, if they interpret the forms as involving grammatical gender, performance should be equivalent for human, animal, and inanimate antecedents. Further, the data will provide some

3. Experiment 2 is part of a larger ongoing study into the acquisition of Welsh by Welsh-dominant, balanced, and English-dominant bilinguals in North Wales.

information on the role that the language of the home might play in the acquisition of these forms.

Method

The general method involved a forced-choice task between two pictures, to find the one that corresponded to the sentence uttered by the experimenter. Within each trial, participants were shown an initial picture that corresponded to an initial sentence involving two nouns, one masculine and one feminine, and then two pictures from which they had to choose one to match a second sentence that included a masculine or feminine pronoun or possessive form.

Non-linguistic stimuli

Sets of pictures were drawn to accompany each trial. In each trial set, an initial picture showed two referents corresponding to two different nouns, one masculine and one feminine, e.g. a dish (*dysgl*, F) and a flower (*blodyn*, M). This first picture was on one side of a card and was to be shown while the experimenter uttered a first sentence with the two relevant nouns. The trial set also included a pair of contrasting pictures, depicted on the other side of the same card. These were shown when a second sentence, containing either a M or F pronoun or possessive form, was uttered. One picture corresponded to an interpretation of the pronoun or possessive as coreferential with the feminine noun in the first sentence, and one corresponded to an interpretation of it as coreferential with the masculine noun. That is, in one of the two pictures, the referent for the masculine noun was depicted with the relevant property (e.g. being broken) expressed in the second sentence; in the other, the referent for the feminine noun was depicted with the relevant property expressed in the second sentence. There were 36 such stimulus sets, corresponding to the 36 linguistic stimuli.

Linguistic Stimuli

Linguistic stimuli were prepared, with each containing two sentences. In the first sentence, a masculine and a feminine noun occurred; in the second, either a masculine or a feminine pronoun or possessive form occurred. The two nouns that occurred in the first sentence fell into three referent types: two nouns referring to humans, two nouns referring to animals, or two nouns referring to inanimate objects. Examples of test

sentences are shown in Table 4, which differentiates between sentences used to test the pronoun interpretations and those used to test the interpretation of *ei*.

Table 4: Sample sentences used as stimuli in Experiment 2

Interpretation of *h, i, o*		
NOUNS FOR HUMANS	NOUNS FOR ANIMALS	NOUNS FOR INANIMATES
(1) *Roedd* **gwr blin** (M) ***a'r gyfnither ddireidus*** (F) *ar ben y sleid. Aeth o/hi i lawr y sleid gyntaf.* 'The grumpy man and the mischievous cousin (F) were on top of the slide. He/she went down the slide first'.	(2) *Aeth* **y pengwin cysglyd** (M) ***a'r gath flinedig*** (F) *i'w gwelyau. Aeth o/hi i gysgu gyntaf.* 'The sleepy penguin and the tired cat went to their beds. He/she went to sleep first'.	(3) *Roedd* **y ddysgl las** (F) ***a'r blodyn piws*** (M) *ar y bwrdd . Ond nath o/hi dorri.* 'The blue dish and the purple flower were on the table. But it (M/F) broke'.
Interpretation of *ei* + AM, *ei* + SM		
NOUNS FOR HUMANS	NOUNS FOR ANIMALS	NOUNS FOR INANIMATES
(4) *Dyma'r* **gwflr pwysig** (M) ***a dyma'r ddynas dda*** (F). *Mae yna het ar* **ei phen**. [*ei* + AM, therefore F] 'Here's the important man and here's the good woman. There's a hat on her head'.	(5) *Dyma'r* **gath dew** (F) ***a dyma'r draenog pigog*** (M). Ond mae 'na bili pala ar **ei thrwyn**. [*ei* + AM, therefore F] 'Here's the fat cat and here's the prickly hedgehog. But there's a butterfly on its (F) nose'.	(6) *Dyma'r* **wasgod ddu** *(F) a dyma'r* **crys pinc** *(M).* Ond ma'**i phoced** yn las. [*ei* + AM, therefore F] 'Here's the black waistcoat/vest and here's the pink shirt. But its (F) pocket is blue'.

The initial sentence in every case was designed so that the nouns were introduced with the definite article *y(r)* and a modifying adjective. Furthermore, these nouns and the adjectives modifying them all began

with one of the following sounds susceptible to Soft Mutation: /p, t, k, b, d, g/. This was done to ensure that in every case, the first sentence would contain clear clues to each noun's gender, since feminine nouns after *y(r)* undergo SM and trigger mutation on the following adjective, while masculine nouns do not.

In the case of the stimuli testing the interpretation of *ei*, the noun modified by *ei* in the second sentence always began with /p/, /t/, or /k/. These are the only three sounds susceptible to both SM and Aspirate Mutation; hence, the construct in every case was clearly marked for masculine (*ei* + Soft Mutation) or feminine (*ei* + Aspirate Mutation) gender.

Each participant had a total of 36 stimulus trials. These trials consisted of 12 sentences with nouns for humans, 12 with nouns for animals, and 12 with nouns for inanimate objects. Within each group of 12, six tested interpretations of pronouns, and six tested interpretations of *ei*. Within each of the six trials on pronouns, half tested the interpretation of *hi*, the feminine pronoun, and half *o*, the masculine pronoun. Similarly, within each of the six trials on *ei*, half tested the feminine *ei* (i.e. with Aspirate Mutation) and half tested the masculine *ei* (i.e. with Soft Mutation). Furthermore, within each of the six trials in each group, three trials presented the masculine noun before the feminine noun in the first sentence (as in sentence 1 in Table 4), while three presented the feminine noun first (as in sentence 3 in Table 4).

Four versions of the 36 stimuli were drawn up, to ensure balancing of stimuli. The four versions (Ia, Ib, IIa, IIb) were constructed as follows. First, sets I and II were identical, except that the order in which the masculine and feminine nouns occurred in the first sentence for each trial of set I was reversed for the comparable sentence of set II (e.g., set I had stimulus 1 in Table 4, set II had its reverse, with the feminine noun before the masculine noun). Second, the (a) and (b) versions of each set were identical except that in the second sentence of a stimulus, one version had the masculine form and the other had the feminine form. Thus, for example, set Ia had stimulus 1 in Table 4 with the masculine form, *o*, while set Ib had the same stimulus, but with the feminine form, *hi*. Finally, the order in which the stimuli were presented was determined as follows. Each of the four versions of stimuli was randomized, and then half of the children received the stimuli in top-to-bottom order, and half received them in bottom-to-top order.

Procedure

Each child was seen individually and sat next to the experimenter.

Children were asked, in Welsh, to play a game. The experimenter showed a picture and uttered a sentence corresponding to it. She then turned over the card, to show the two choice pictures, and uttered the second sentence. The child was instructed to point to the picture that the experimenter was 'talking about'. Two practice items that were not relevant to the task were used; these were followed immediately by the trial items.

Participants

The data presented here come from a preliminary set of 101 participants. These fell into three age groups: 26 'five-year-olds' (mean: 5;7, range: 4;8-6;5), 37 'seven-year-olds' (mean: 7;10, range: 6;9-8;10), and 38 'nine-year-olds' (mean: 9;11, range: 8;11-11;1). Fifty-five were female; 46 were male. The children came from one of three types of homes: homes in which Welsh was spoken over 80% of the time since the child was born (N=60), in which English was spoken over 80% of the time since the child was born (N=15), or in which both Welsh and English were spoken 40% to 60% of the time since the child was born (N=26). Approximately half the children were classified as high SES (N=50) and half as lower SES (N=51), based on the parents' educational levels and professions.

Results

An ANOVA was conducted in which age (5, 7, 9); home language (OWH [only Welsh at home], OEH [only English at home], and WEH [Welsh and English at home]); and SES (high, low) were treated as between-subjects variables. Linguistic form (pronoun, possessive), animacy (human, animal, inanimate), and gender (feminine, masculine) were within-subjects variables. Results revealed the following significant effects.

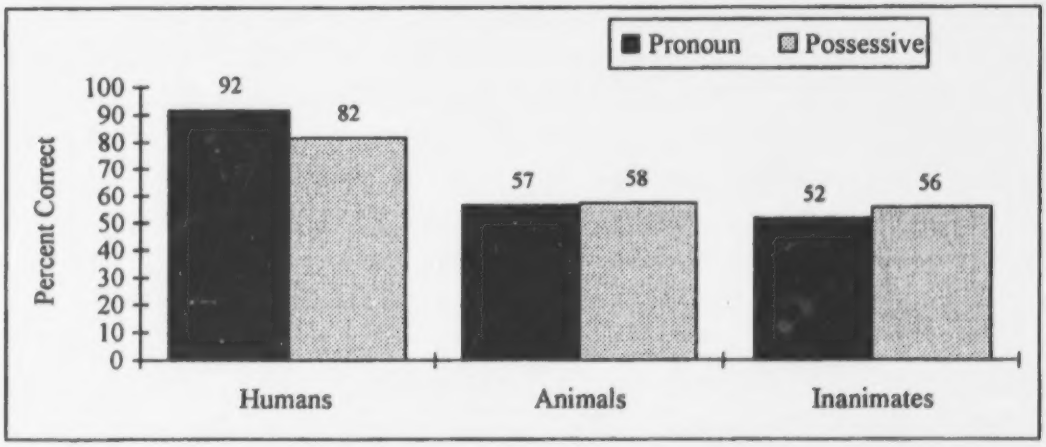
First, there were main effects of age ($F(2, 85)=9.54$, $p<.0002$), home language ($F(2, 85)=4.39$, $p<.02$), linguistic form ($F(1, 85)=6.06$, $p<.02$), and animacy ($F(2, 170)=60.78$, $p<.0001$). The effect of age was due to the fact that the responses of the children in the three age groups all differed from one another (Student-Newman-Keuls analysis, $p<.05$), with 60.9% accuracy at age 5, 65.7% at age 7, and 70.1% at age 9. The effect of home language revealed significant differences in performance by children coming from OEH homes (at 61.5% accuracy) versus OWH homes (68.2% accuracy), Student-Newman-Keuls analysis, $p<.05$. (Those coming from WEH homes fell between these two, at 63.9% accuracy, which was not significantly different from either of the other groups.) The main effect of linguistic form revealed that there was better performance overall on the

pronouns (67% correct) than on the possessive (65.2%). Finally, the main effect of animacy was due to better performance on sentences involving human referents (87.2% correct) than on those involving either animal referents (57.1% correct) or inanimate referents (54.0% correct) — human vs. animal: $F(1, 170)=81.5$, $p<.0001$, human vs. inanimate: $F(1, 170)=99.9$, $p<.0001$. There were no other significant main effects.

There were also several significant two- and three-way interactions: linguistic form x animacy, $F(2, 170)=17.53$, $p<.0001$; animacy x age, $F(4, 170)=3.87$, $p<.005$; gender x animacy, $F(2, 170)=4.67$, $p<.02$; linguistic form x home language, $F(2, 85)=3.21$, $p<.05$; linguistic form x gender x home language, $F(2,85)=3.32$, $p<.05$; linguistic form x gender x animacy, $F(2, 170)=7.34$, $p<.0009$; and linguistic form x animacy x home language, $F(4, 170)=5.45$, $p<.0004$.

Figure 9 shows performance according to linguistic form and animacy. Follow-up analyses revealed significant differences in performance on pronouns when they referred to the three types of antecedents (all Fs (1, 170) ≥ 8.9, $p<.004$), and significant differences in performance on the possessive when it referred to human antecedents versus animal or inanimate antecedents (both Fs (2, 170)≥ 18.4, $p<.0001$).

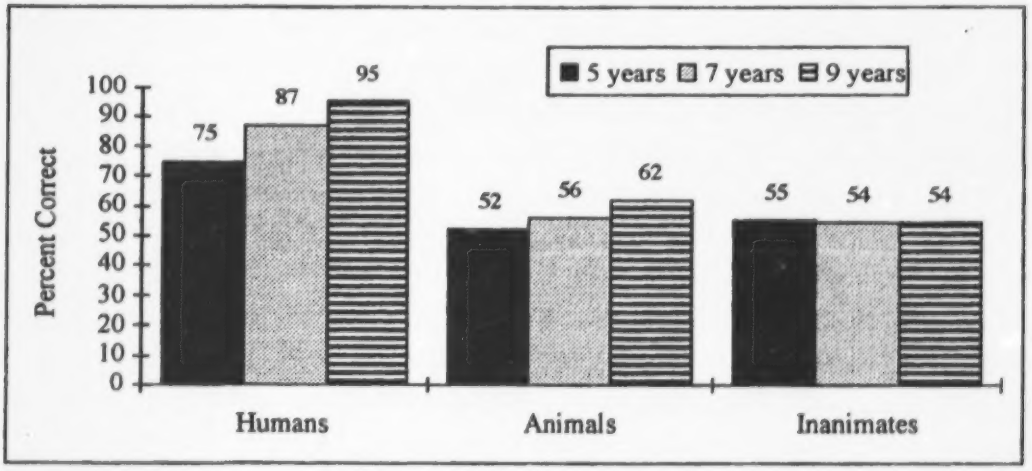
Figure 9: Performance by linguistic form x animacy, Experiment 2



Performance by animacy and age is shown in Figure 10. There was clear development by age in relation to human referents, a slight improvement with age in relation to animal referents, and no change with age in relation to inanimate referents. It should be noted that the improvement with age in relation to humans and animals occurred both with the pronouns and with the possessive (*humans*: pronouns: 80%, 90%, and 100% at the three ages, respectively; possessives: 71%, 81%, and 90%, respectively; *animals*:

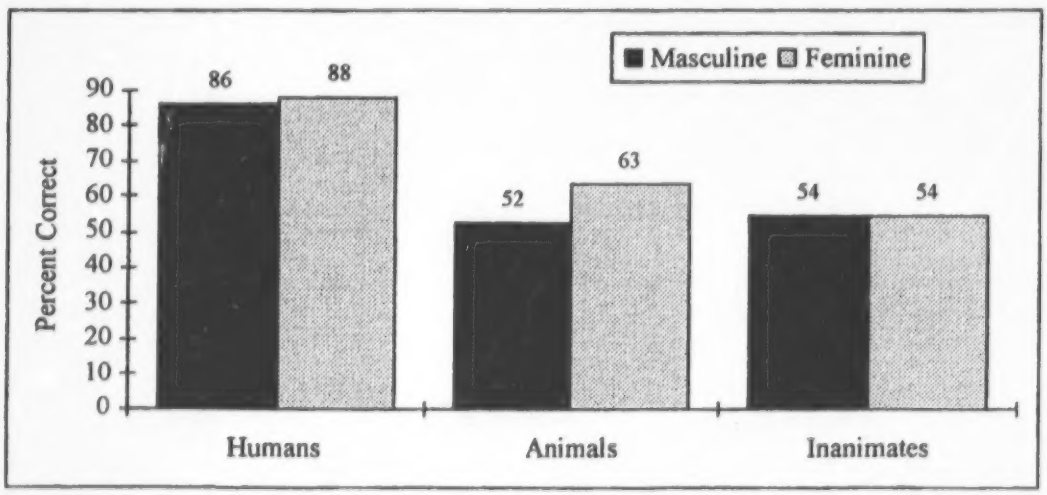
pronouns: 52%, 55%, 61%, respectively; possessives: 53%, 57%, 62%, respectively).

Figure10: Performance by animacy x age, Experiment 2



Performance by gender and animacy is shown in Figure 11. Follow-up analyses revealed significant differences on the three types of referents with feminine forms (all comparisons, Fs(1, 170)$\geq$8.1, p<.005) and between forms with human referents versus animal or inanimate referents with masculine forms (both Fs$\geq$37.2, p<.0001).

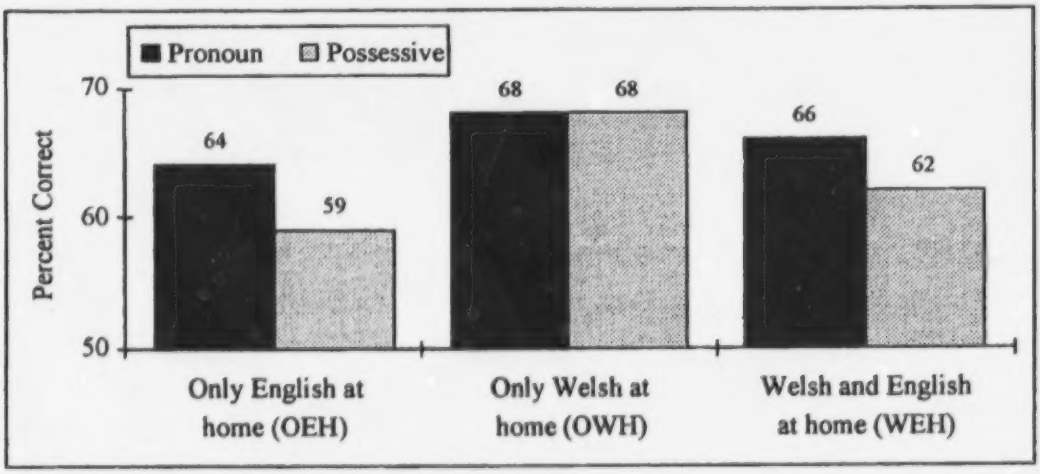
Figure11: Performance by gender x animacy, Experiment 2



Performance by linguistic form and home language is shown in Figure

12. While the OWH group performed similarly on the two constructs, the OEH and WEH groups performed better on the pronouns than on the possessive.

Figure 12: Performance by linguistic form and home language, Experiment 2



The three-way interactions of linguistic form and home language with animacy and with gender, shown in Figures 13 and 14, illuminate the source of these interactions. Figure 13 shows performance by animacy and linguistic form, broken down by home language. Follow-up analyses revealed that there was no difference across home language groups in performance on pronouns by animacy, but there was in performance on the possessive by animacy, $F(4, 196)=4.4$, $p<.002$. Specifically, the OWH group performed better on the possessive in relation to humans and animals than the other two groups.

The significant interaction of linguistic form x gender x home language (Figure 14) is due to the fact that within the OWH group, there was a significant difference in performance on the possessive in relation to feminine versus masculine antecedents, $F(1,59)=28.2, p<.0001$. (The other two home language groups showed no significant difference there.) Examination of the data reveals that while all three groups performed similarly on the possessive with masculine antecedents, the OWH group performed better on the possessive with feminine antecedents, especially antecedents that referred to humans and animals. (Performance on the possessive with feminine human antecedents was OWH: 91%, OEH: 71%, and WEH: 80%. Performance with feminine animal antecedents was OWH: 78%, OEH: 51%, and WEH: 59%. With feminine inanimate antecedents performance on the possessive was uniformly low — OWH: 54%,

OEH: 51%, and WEH: 54%.) These results indicate that the OWH group had a better command of the feminine possessive construct, especially in relation to humans and animals, than the other two groups did.

Figure13: Performance by animacy x linguistic form x home language, Experiment 2

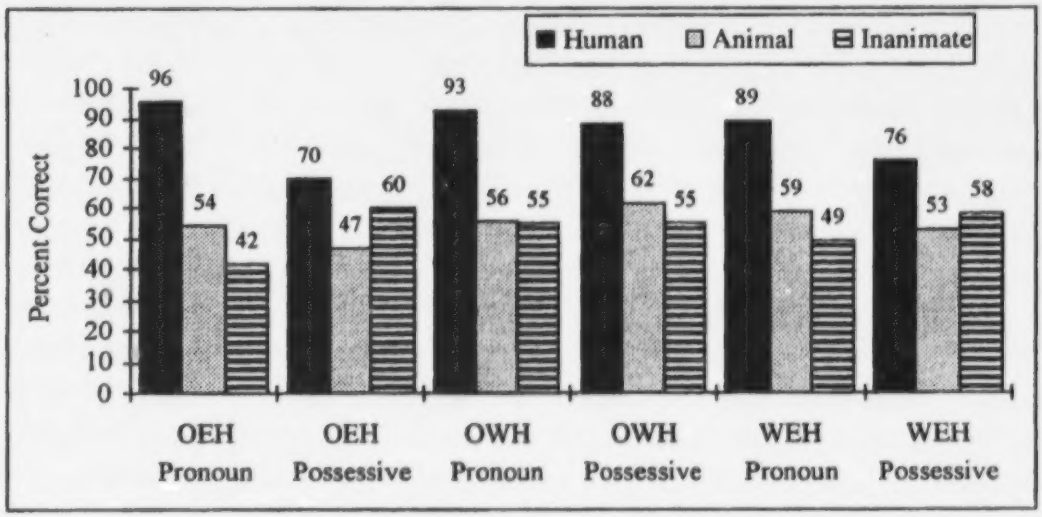
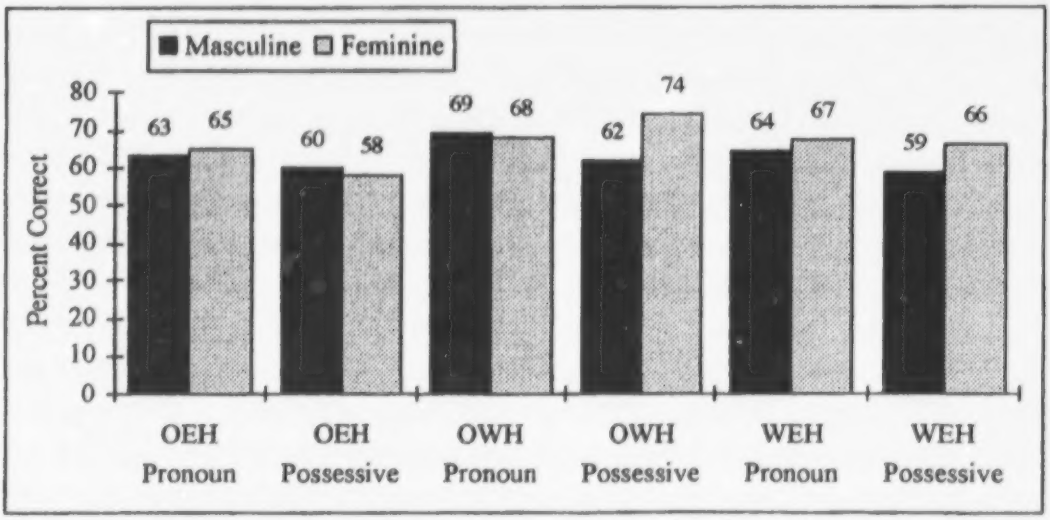


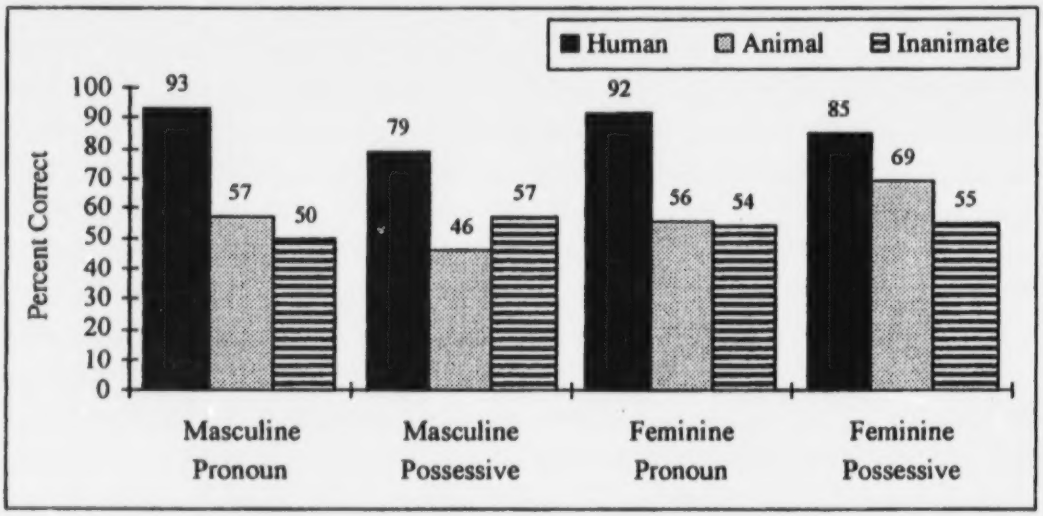
Figure14: Performance by linguistic form x gender x home language, Experiment 2



Finally, the performance by linguistic form, gender, and animacy is

shown in Figure 15. Follow-up analyses revealed that there was no significant difference in performance by gender on the pronouns, but there was a significant difference by gender in interpretation of the possessive in relation to animals and inanimates (Fs (1, 170) $\geq$ 9.8, $p < .002$). Specifically, performance was better on feminine than masculine possessives in relation to animals ($F(1,170)=16.9$, $p<.0001$), but better on masculine than feminine possessives in relation to inanimates ($F(1,170)=9.8$, $p<.003$).

Figure15: Performance by linguistic form x gender x animacy, Experiment 2



Summary and discussion, Experiment 2

These data reveal the following with regard to children's interpretations of long-distance constructs involving pronouns and the possessive *ei*. First, performance was best in relation to human antecedents and worst in relation to inanimate objects. Performance on animals was sometimes between these two, sometimes equivalent to inanimates. Second, there was a general progression with age, especially with regard to human, but also to animal, antecedents. That progression occurred in relation both to pronouns and the possessive. Third, overall performance was better in relation to the pronouns than the possessive. Fourth, the OWH group performed better than the other two groups, especially with regard to feminine uses of the possessive in relation to humans and animals.

These results shed some light on the questions posed at the outset, as follows.

(1) *To what extent are children's interpretations of gendered pronouns*

*(*hi *[F] and* o *[M]) and of the third person singular possessives (*ei*) dependent on the grammatical gender of an antecedent, and is there a change with age?* The data indicate that children do have the capacity to interpret gendered forms in relation to the gender of an antecedent at a relatively early age, but this ability does improve with age. However, the exact nature of this ability is contingent on the type of form (see point 2) and the nature of the referent (point 3).

(2) *Is there a difference in children's reliance on grammatical gender in relation to pronominal forms (which do not involve mutations) versus the possessive form (which does)?* Children were better at responding to the pronominal forms than to the possessive form. However, there was improvement on responses to the possessive form, especially for feminines, and especially in the OWH group.

(3) *Is there a difference in children's abilities with the two types of forms in relation to human, animal, and inanimate antecedents?* These results clearly indicate better performance in relation to human referents than in relation to animals and inanimates. This difference applies to both pronominal forms and possessive forms.

(4) *Finally, is there a difference in children's abilities according to the language used in the home, whether Welsh only is spoken, both Welsh and English are spoken, or English only is spoken?* The data show differences between the OWH group and the other two groups, with OEH children performing worst overall. These differences are most likely due to frequency of input (see Gathercole, in press a,b,c for a similar suggestion with regard to Spanish-English bilinguals in the Miami area). The primary advantage of the OWH group appears to lie in the developing ability with the possessive form in relation to feminine referents, especially humans and animals.

General Discussion

These two experiments together provide some insight into the process by which Welsh-speaking children break into the complex grammatical gender system. Experiment 1 tested children's productive capacities in relation to local gender marking with masculine and feminine nouns for inanimate objects. The data suggested that children of these ages have not (yet) developed an abstract, rule-based system, but, rather, have a constellation of

piecemeal knowledge concerning the use of mutation in relation to gender. The results showed (a) consistently high use across ages of the basic forms of nouns when those nouns were masculine, (b) some overuse of mutated forms of adjectives in masculine contexts, especially at older ages, and (c) underuse of mutated forms of feminine nouns in contexts that require SM, i.e. after the definite article.

One might wonder whether one could interpret these results as indicating that Welsh-speaking children simply use basic forms of nouns for both masculine and feminine nouns (hence, a high level of performance on masculines and low on feminines) and mutated forms of adjectives as the 'default' form for adjectives (hence, the overextension of mutated adjectives to masculine constructs). A close examination of the data suggests that this would not give an accurate picture, however. First, the high performance on masculine nouns and lower performance on feminine nouns are not inverses of each other. So, for example, on task 4, Figure 7, children performed at 98% accuracy on giving the (basic form of) real masculine nouns after the definite article, but gave the basic forms of real feminine nouns after the definite article only 78.5% of the time. Similarly, the use of mutated forms of adjectives with real masculine nouns in task 3 occurred only 9.1% of the time, compared with 36.4% of the time with real feminine nouns. (In fact, among the 9-year-olds, who showed the greatest tendency to overextend mutation to adjectives in the masculine context, mutation of adjectives with real masculine nouns occurred only 21% of the time, while with real feminine nouns, it occurred 60% of the time.)

The results of Experiment 2 give a similar picture of piecemeal learning, this time in relation to gender marking in distant constructs involving pronouns and possessive forms. The data suggest that Welsh-speaking children may break into this system through gender marking in relation to nouns for human referents, linking gender to real-world, natural gender. If the knowledge of gender marking remained limited to use for humans, then one might conclude that the grammatical gender system of Welsh is becoming a natural gender system. One clue that this may not be the case is the developing command of gender in the OWH group, the most advanced of the three groups, in relation to possessives as they apply to animal referents. The discrimination of the masculine and feminine uses of the possessive in relation to animals goes beyond natural gender, because it is not the natural gender of the animal that determines the gender of the noun, but the particular conventional assignment of the noun to one grammatical gender or the other. (E.g., *ci* 'dog', *mochyn* 'pig', and *gloyn byw* 'butterfly' are masculine, but *cath* 'cat', *dafad* 'sheep', and *tylluan* 'owl' are feminine.)

There are two possible reasons why the OWH children differ from the OEH and WEH children in this regard. One is that the OWH children may be ahead of the other two groups, in which case we would expect the other children will eventually catch up and also begin to treat gender as grammatical gender (see such a suggestion by Oller, in press regarding 'catching up' by certain Spanish-English bilingual groups). The other possibility is that the OWH children may be less influenced by English than those who come from OEH and WEH homes. Since English is a natural gender language, perhaps greater dominance from English in the bilingual's system may lead a child to tend towards a more natural gender approach than greater dominance in Welsh would. That is, perhaps in the end, the OWH group will be the only ones whose command of gender in Welsh moves away from natural gender towards more grammatical gender. This intriguing possibility will have to be left for further research.

The ultimate conclusion to be drawn from the two experiments is that when a language presents the child with a very complex and opaque system for gender, the course of development is protracted and variable. Children acquire SM for gender in a very piecemeal fashion, and the child appears to draw on multiple sources to construct that system. The differences between the near-perfect use of basic forms for masculine nouns and more varied use of mutated and non-mutated forms for feminine nouns and for adjectives modifying both masculine and feminine nouns may have their source in the differences in the frequency and consistency with which these distinct forms are heard in the input to the child. Similarly, the possible movement from a more natural gender system for humans to a more grammatical gender system through the gradual extension of the feminine possessive form to nouns for animals may stem from the fact that the feminine possessive involves Aspirate Mutation, not Soft Mutation. While SM applies in a vastly varied set of distinct morphological and syntactic contexts, Aspirate Mutation is more confined to just a few constructs. Its application in the case of the feminine possessive form may thus provide a more reliable cue to gender than the application of, e.g., Soft Mutation in the case of the masculine possessive (cf., for example, MacWhinney, Bates, and Kliegl 1984; McDonald 1986; MacWhinney 1987; Sokolov 1989; and Bates and MacWhinney 1989). The feminine possessive, then, may provide the 'window' that children need to be able to look beyond the tangle of information in the input that Soft Mutation provides towards a clearer glimpse of a system governing grammatical gender in Welsh.

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Irish language learning software: *SpeakWrite Irish* (http://www.galmac.ie/SpeakWrite.htm) and *Focail Draíochta* (www.ceolsoft.com).

The two software packages to be reviewed here, *SpeakWrite Irish* and *Focail Draíochta*, are just a few of the many software packages currently available to assist in the Irish language learning process. The reviews below will consider issues pertaining to content, user-friendliness, hardware needs, cost, and availability of each product.

Some readers will have already been introduced to *SpeakWrite Irish* while attending an Irish language summer school in Ireland in the 1990s. At the time, some may have been disappointed to know that *SpeakWrite* was available in the Apple form only. However, today one can order the product in either Mac or PC version.

SpeakWrite Irish is a fairly comprehensive language learning program available in three levels (volumes). This project was grant funded by the European Union through the Lingua/Socrates Program and developed collaboratively by the National University of Ireland, Galway, GalMac, and Quandrant Learning Systems. In Volume 1, which this review sampled, the themes are 'meeting a friend, making an acquaintance, a visit to the doctor, discussing a holiday, a conversation about clothes, at the supermarket, arranging the schools timetable, playing tennis with friends, attending a pop concert, and in the restaurant'. Each unit starts out with a substantial dialogue read by native speakers at natural speed. The program highlights each line as it is spoken. You can click on any word in the dialogue to hear it, receive a translation, hear the sentence that contains the word at natural or slow speed, see the sentence in English, and receive a grammar explanation in English that pertains to this sentence. Additionally, there is also a general grammar index that one can access in this and other activities. One can also see the entire dialogue text in English.

Related to the dialogue, there are a number of activities one can access after experiencing the dialogue. At the beginning level there are comprehension questions with multiple choice answers all in English. One can see the dialogue (in Irish) on the lower half of the screen as one answers the questions. Score is calculated and immediate feedback given. One difference here from other parts of the program and other similar software packages is that some of the English versions of names (that were in their Irish version in the dialogue) are used in the questions. In that one wants to reinforce the acquisition of the new language, it may have been more effective to always refer to 'Gearóid' as 'Gearóid' in both the English and Irish versions as opposed to using 'Garrett' in the English.

Roleplay is another activity based on the dialogue. Users are asked to take on one of the roles from the dialogue. They are prompted as to the general idea of what they should say. Additional prompts can be requested. They can record their lines and then compare their utterance with the course's sample. One can change one's role. The graphics are useful. Completion is yet another activity that provides the entire dialogue with cloze exercises. Students must type in their responses. Immediate feedback is given. A section entitled 'Further Study' allow students an extension activity integrating the theme, communicative aim, and grammar. In the Open Dialogue section, a character on the computer converses with the students. An oral question is asked and the student must pick one of several multiple choice answers including 'pardon me' and 'please write that out for me'. The questions are at native speed and include pictures of the character who is conversing with the student.

While I was only able to review level or version one, this software appears to be full of activities that are highly motivating and enjoyable to experience. For those planning to visit the Gaeltacht for the first or an additional time, the language speed (although it can be slowed down), themes, and pictures are motivating factors in themselves. The program is extremely user-friendly and enables the student to move around from activity to activity as needed. The user will need a CD-ROM drive, sound card, speakers, and microphone to be able to use all of the functions of this software. Initially, the largest negative factor regarding this software was its price. The three levels together cost £125 (or £50 per level) not including postage and packaging and 20% VAT. While just a few years ago this could have equalled $200 US dollars, with the current favourable exchange rate, the US dollar equivalent has been reduced greatly. By visiting the above website, one can request more information (last year, GalMac offered sample CDs). If you prefer to write GalMac, their address is GalMac Computers Ltd., Liosbaun Industrial Estate, Tuam Road, Galway. Phone: + 353 (0)91 755222, Fax: + 353 (0)91 755491.

The second software package under review here is *Focail Draíochta/ Magical Words* by Ceol Software. The goal of *Focail Draíochta* is vocabulary acquisition. Grammar and comprehension are only taught by way of vocabulary lessons. The themes and vocabulary taught supports the Irish language curriculum for schools in the Republic of Ireland and the package is designed for use by learners of six years of age and older. The software is wonderfully illustrated. The graphics will delight children and adults. One does not have the cultural component with this program that one experiences with *SpeakWrite Irish*. This is clearly aimed at projecting

Irish as a cosmopolitan and national language as opposed to a community-based and Gaeltacht language.

Ten themes are always accessible on the top of the screen. Clicking on one of these produces a list in either Irish or English of words related to this theme. Each Irish word is presented with a phrase using the word in context, the translation, a related drawing (that usually moves), plural, synonym, and the singular with the definite article. Both the singular and plural forms can be heard by clicking on them.

On the bottom of the page, one can click on pictures to go to the next or previous word, drill, notes, sound, and print. The notes give related Irish words with pictures for nouns and conjugations for verbs. 'Drill' here does not refer to practice, but rather to moving down sub-levels of a theme.

Focail Draíochta clearly is a reference tool with an extensive vocabulary of over 1200 words with excellent graphics to the point that one does not need to rely on the English translations. The ability to hear the pronunciation for both the singular and plural is something often missing in other resources (such as the *Foclóir Póca*). The article/noun combinations reminded the reviewer of the reference list at the end of *Buntús Foclóra.* In terms of North Americans learning Irish, this program is a valuable reference tool for the beginning and lower intermediate student and an excellent review package for middle and advanced intermediate students. While this is not a comprehensive language learning product, it lives up to its name in aiding with the learning of more *focail*/words.

One word of warning regarding *Focail Draíochta* concerns the type of processor needed. One needs to have a Pentium II processor or higher to use the software. The reviewer tried the software on his home Pentium I PC and his Pentium I laptop without success, so one is warned to heed the system requirements. A complete list of these can be found at the company's website, http://www.ceolsoft.com/. *Focail Draíochta* is cited as costing £25 or $40.00 on their website. Postage for the United States is cited as $7.00 for priority mail and $5.00 for normal mail. For the latest prices and details, contact Ceol Software directly at info@ceolsoft.com.

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Announcements

The **8th annual conference of the NAACLT** will take place at St. Francis Xavier University, Antigonish, Nova Scotia, Canada from 24 May to 26 May 2002.

The **NAACLT website,** which is located at

www.naaclt.org

provides further information on all NAACLT activities, membership matters, and other related topics.

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